THE IRON AGE

THURSDAY, FEBRUARY 23, 1888.

Single Exhaust Nozzles for Locomotives.

In an article on "Exhaust Nozzles," which recently appeared in the *National Car and Locomotive Builder*, our contemporary says:

There is nothing to be seen in a year's search among the locomotive shops of America that more strongly emphasizes the conservative tendencies of some of our mechanical men than the persistent way in which many master mechanics cling to the use of double nozzles after the conditions that made their use desirable have been changed. In some quarters the single exhaust nozzle has not been tried, owing to the traditions that it would cause back pressure, and in other cases failures have been made with it through using a bad form of exhaust pipe. With the exercise of a little thought and care in designing an exhaust pipe tending to lead the steam from both sides together gradually, there is no difficulty with back pressure from a high single nozzle. As it is necessary to raise the exhaust pipe, and that occupies the space formerly held by the lift pipe, the exhaust pipe is the right place in which to bring the steam from both sides to a common center.

With a well-designed high exhaust pipe ending in a single nozzle, as large as can be used, there is less back pressure in the cylinders than there is with double nozzles, and an engine will steam with a much lower velocity of the fuel gases. That is, the exhaust does not require to be so strong. There are several advantages derived from this. The fuel gases go more slowly through the flues, and a greater proportion of the heat is abstracted; the exhaust has a milder effect on the fire and its surface will not be torn up as with small nozzles, making combustion irregular and the passage of air uneven, and there will be fewer sparks drawn through the flues to waste fuel and start fires. These benefits are so important that every master mechanic interested in operating his locomotives economically ought to see that prejudice or want of judgment does not obstruct the successful introduction of the single nozzle as the opening to the high exhaust pipe. The locomotives that are doing the greatest amount of work with the fuel consumed are using a single nozzle exhaust. What can be done successfully on one road may be achieved on all others if the proper means are employed.

A Large Roll Turning Lathe.

On this page and the two succeeding we present engravings of what is probably the most massive and powerful lathe of its size that has ever been turned out in this country. It was built by the Betts Machine Company, of Wilmington, Del., for the Otis Iron and Steel Company, of Cleveland, Ohio, for dealing with their heavy forged shafts and large steel roll castings, so that they might be rough turned before being sent from the works. The lathe is screw-cutting, and swings 66 inches diameter over the shears and 48 inches diameter over the carriage. The shears are 43 feet long, which will admit a shaft 30 feet long between the centers. The weight of the lathe is 101,900 pounds, and it took four cars to transport it to its destination. The shears are 6 feet wide, and weigh 1000 pounds per foot. They are made of the double form, with the feed-screw lying in supports between two vertical walls of metal, which obviates the overhang of carriage and tool holder when used on the largest diameter which the lathe will swing over the shears. The head-stock is over 7 feet long, with gearing so arranged that it can be used either single, double, treble or quadruple, at the pleasure of the operator, giving 20 changes of speed on the face-plate. The ratio of gearing is 250 to 1, and the gearing is all made of steel and accurately cut except the face-plate and its pinion, which have the cogs cast in. It is driven with a five-step cone pulley, the largest step being 30 inches in diameter, and of suitable width for a 4-inch belt. The spindles in both heads are of forged steel, and the thrust-bearing marked A, in Figs. 2 and 3, on the live spindle, is of large diameter, and well provided for taking the great strain that will be put upon it.

The tail stock is made in two pieces, with a set-over arrangement for turning tapers. The top piece of the casting is split for a portion of its length lengthwise with the spindle in such a way as to permit of the spindle being clamped with two bolts, so as to make it practically solid when on heavy work. A rack is cut in the shears into which a pinion engages. This pinion is attached to the head-stock for moving it on the shears. Gearing is attached to the tail stock so that the workman may operate the spindle when in a suitable position to see the center. The tail stock is secured to the shears by six heavy bolts, which does away with the necessity of putting pins in the shears to prevent slipping when great weights are in the centers. The latter are made heavy enough to carry 25 tons.

The carriage is very massive and strong, and of the best form to withstand the great strains to which it is subjected. It has three bearings on the shears, one at the back and two at the front. This feature gives the tool-post great rigidity, even when turning the maximum diameter that the lathe will swing, as the outer web of metal in the shears is directly under the tool-post when performing this duty. The carriage is fed through a train of cut steel gearing and a screw, and it has also an automatic cross-feed in either direction, all of which feeds are driven by cone gearing, V V^1, (Fig. 2) with three changes, so as to vary the feeds without changing the wheels. These cone gears are operated by the handle K (Figs. 2 and 3), which is within easy range of the operator. A complete set of cut steel change gears accompanies the lathe for cutting all pitches of screws. These are adjusted on a stud, which is secured in a swinging stud plate G (Fig. 2). The cross-feed for the carriage is taken from the rod C, and, with suitably, arranged gears and friction feeds, E and D, brings the whole under easy control of the operator. A rack is cut in the shears to facilitate a hand movement of the carriage when it is desired to move it a short distance. The lead-screw L is $4\frac{1}{2}$ inches in diameter, and lies in supports, which are planed in the shears about every 2 feet of its length.

Quite a novel feature for connecting the carriage and screw is introduced in the

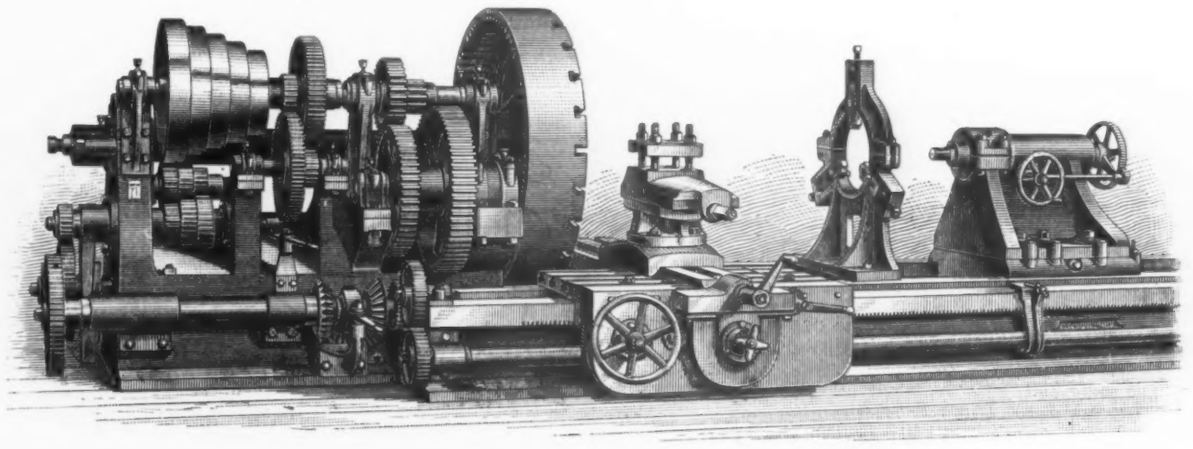


Fig. 1.—General View.

ROLL-TURNING LATHE, BUILT FOR THE OTIS IRON AND STEEL COMPANY, BY THE BETTS MACHINE COMPANY, WILMINGTON, DEL.

nuts, and the manner of attaching them. Without going into all the details here, we may say that, in a lathe as ordinarily constructed, it is quite a job to get a worn nut out, and to replace it with a new one; but in the lathe we are dealing with this difficulty has been avoided. On the top of the carriage is shown a rectangular plate, M, secured by four screws. These can be removed and the plate lifted out of its place, exposing the nuts. The coarse thread right and left hand screw which opens and closes the nuts, and its handle, J, can then be removed, and the nuts (of which there are two) can be taken out without disturbing anything else on the carriage. A pair of gear-wheels and a set of pulleys, F, are placed on the end of the lead-screw at the back end of the lathe. By these the carriage can be moved by power from an independent countershaft.

Perhaps the best idea of the nature of the different motion can be obtained by following them step by step from the driving cone. We will suppose, therefore, first, that we wish to drive the lathe single geared. The wheel P^2 is keyed on the hub of the pinion P^1, and both can be slid on their shaft so as to disengage the wheels P and P^3. This operation will get them entirely out of the way. The pinion T can be slid along its shaft out of gear with the gear-wheel T^1. The wheel R being keyed to the cone pulley shaft S, will then of course drive the wheel R^1 and its shaft, on which is the pinion that gears into the internal wheel of face plate. This is called the single gear, though, strictly speaking, it is not so; for as there is some difference in the diameter of wheels R and R^1, it is double geared, though not to any great extent.

For double gear proper the motions are as follows: The wheel R being keyed on the nut of the pinion T, if we slide the latter into gear with wheel T^1 the wheel R will not engage wheel R^1, as shown in Fig. 2. The cone shaft S then drives through the pinion T into T^1 and the pinion at the end of the shaft carrying T^1. into the face plate.

For treble gearing there is an arrangement on the cone pulley shaft in the wheel P^3 by which the cone pulley can be disengaged from its shaft and allowed to run loose. The cone and the pinion P, which is fast to it, then gears into the wheel P^2, the pinion P^1, which is fast to the latter, into the wheel P^3, the gear R into R^1, and this finally drives the face plate pinion, being on the same shaft. For quadruple gearing the wheel P gears into P^2, then P^1 nto P^3, T into T^1, and thus to the faceplate pinion. Reference to Fig. 2 will, we think, make all this clear without difficulty.

To get the motion to the feed screw and rod for cross feed, &c., there is a pinion, U, on the main spindle (see Fig. 3). This gears into the middle wheel in the cone gears, marked V in Fig. 2. These gears also drive the gears V^1, locking which ever one is desirable by the handle K. From this point motion is transmitted further through the train of wheels X, X^1 Y and Y^1. The gear wheel Y^1, it will be observed, drives the first of the clutch bevel wheels B, by means of which the motion may be either stopped or revesed, the operator having control through the handle O (Fig. 3). The way in which motion is transmitted to the rod C will, no doubt, be readily understood from the engravings, a number of spur gears being provided for the purpose. From this rod motion is again transmitted to the cross-feed screw W through suitably arranged friction gearing controlled by the hand-wheel D. The motions of the lead-screw are entirely independent of the cone pulleys and face plate of the lathe—that is to say, can be driven forward or backward or stopped while the cone is running in

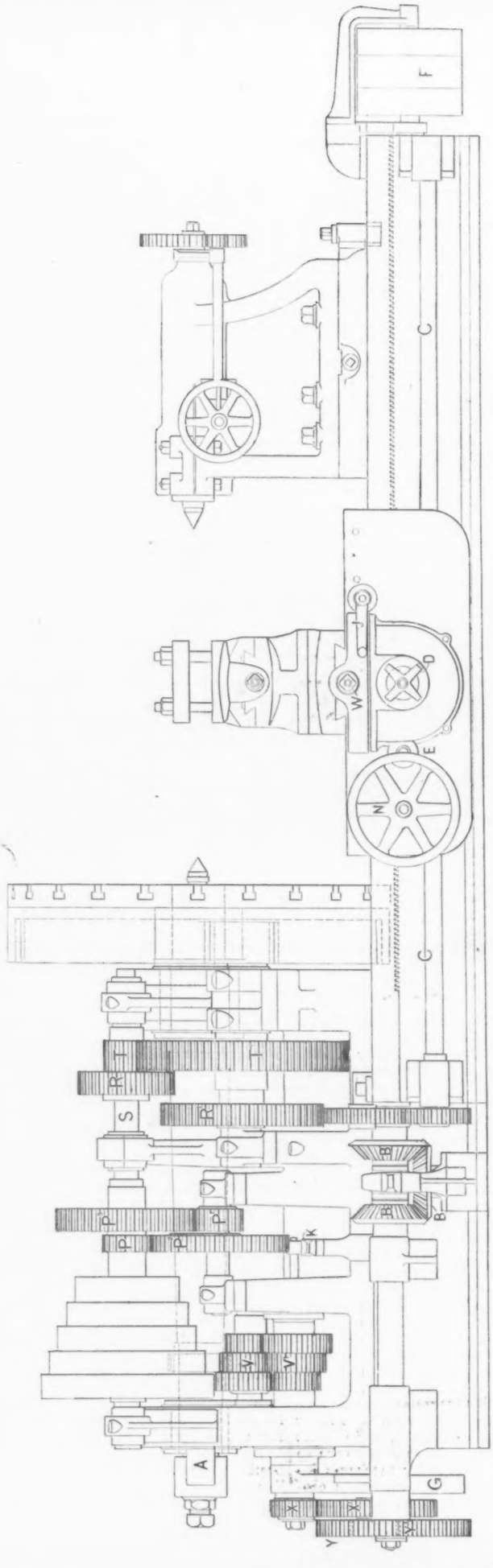


Fig. 2.—Front Elevation.

ROLL-TURNING LATHE, BUILT BY THE BETTS MACHINE COMPANY, WILMINGTON, DEL.

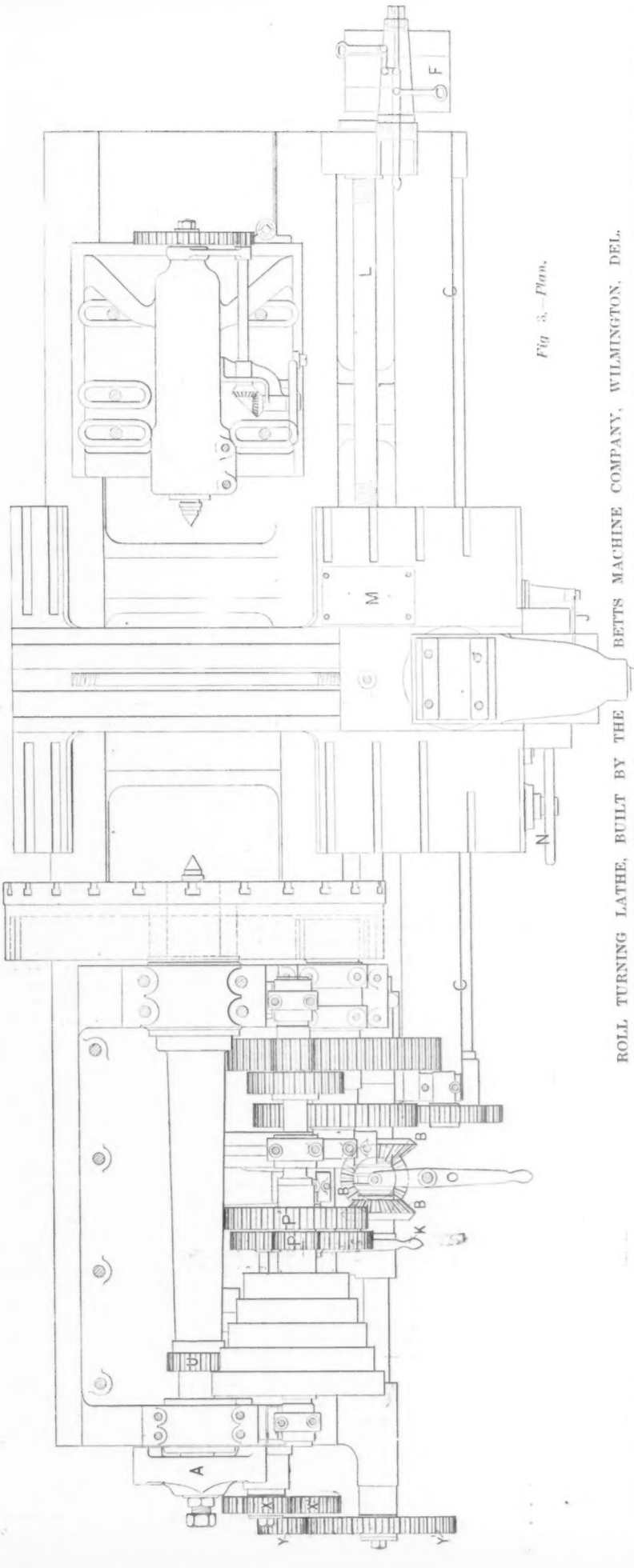


Fig. 3.—Plan.

ROLL TURNING LATHE, BUILT BY THE BETTS MACHINE COMPANY, WILMINGTON, DEL.

either direction. The carriage being a heavy one, weighing about 10,000 pounds, of course moves hard on the shears, consequently it is double geared, so as to give the workman ready command over it. The lathe has been very carefully designed, and all of the points have been kept in view that will be required of it when on the heavy duty for which it is intended. The following duty, we are informed, was performed a short time ago when rough turning a steel shaft 24 inches in diameter. One tool was reducing the shaft 4¼ inches and the other tool was reducing it at another point 3½ inches in diameter at the same time, and both were being fed with $\frac{1}{12}$ inch feed.

The Betts Machine Company are now building another lathe from the same patterns for the Midvale Steel Company, to be used on the guns which they are making for the United States Government.

Belt Stretching and Testing Machines.

All users of belting have experienced the trouble caused by a large amount of stretching in belts that takes place when the belts are new and first put into use. Various means have been resorted to in times past to remedy this trouble by special processes in the stretching of the leather before the leather was "made up" into belts. By these means belts do not stretch at present as much as they did formerly. It was not until very recently, however, that methods have been found by which belts after being made could be properly tested, and a very large per cent. of the stretch taken out. It is of some interest to note, therefore, that the Page Belting Company, of Concord, N. H., have now in use at their works a machine designed by Mr. George F. Page, president of the company, designed to accomplish, after the belting is in rolls, the testing and the stretching which has heretofore been done after the belt has been sold and put into use.

In this machine, a belt is subjected to the same experience that it receives in actual use. The belting is drawn from a roll at the right and is bound up on a roll on the left of the machine. The right-hand portion of the machine is made up of a number of tension rolls, over and below which the belt is passed and is then led to three large rolls similarly arranged. With these rolls, at the side of the machine, are connected two pulleys over which a brake passes, connected with the lever, and by means of this brake jacked down to any tension desired. Two of these rolls act as a countershaft upon which the belt runs. The friction upon the pulleys at the side in the frame represents the load or work given to the belt. The rolls are propelled by three gears worked by a belt running upon a tight and loose pulley. These three large rolls, simply by the force of traction, just as the belt is driven when in use, draw the belt forward through the resistance rolls. The belt thus has a steady, uniform motion from one end to the other as it passes through the machine. The manipulations of the belt over and under the various rolls, together with the strain caused by the resistance rolls, tests it in every part as to strength, fastening of the laps, straightness, &c. The great advantages offered in belts treated by this machine will be apparent to every user of belting. At the factory of the Page Belting Company, of Concord, N. H., the belt is run through the machine several times, first one end forward then the other, so that it is as thoroughly tested and stretched as possible. The machine has now been in use by the Page Belting Company long enough to demonstrate its great value as an additional facility to the manufacture of first-class leather belting.

The McAuley Process of Burning Pulverized Fuel.

One of the most important problems of the day is the economical use of fuel, and much ingenuity has been expended in attempts at its solution. All are interested in this matter, for all are in some way connected with the fuel question. Iron and steel furnaces, factories, locomotives, steamships and the domestic hearth—one and all are most lavish users of fuel. When it is considered that it is theoretically possible to generate 1 horse-power by the consumption of ½ pound of coal per hour, and this is compared with the results of actual practice, an idea is obtained how much room there is for improvement. An ordinary non-expansive, non-condensing engine requires commonly from 10 to 12 pounds of coal per horse-power per hour, while in our best expansive and condensing engines the same amount of work is accomplished with 2 pounds per hour. But the latter figure represents excellent practice rarely reached by the majority of even large fuel consumers. The average consumption of fuel may be put down as at least 4 pounds per horse-power per hour.

At the present day nearly all efforts to further economize fuel are being made in the direction of better boilers and furnaces, more efficient engines, better workmanship and skilled management—in fact, in the more economical use of the heat after it has been produced. Many inventors have, nevertheless, with varying degrees of success, attempted the more perfect combustion of the fuel itself, as well as the burning of cheaper fuel than ordinary coal. All manner of patent fuels have been tried, as well as oil and natural gas. Mechanical firing has been resorted to, but in all such processes there seem to have been objectionable features of great magnitude. It has long been recognized that if coal could be finely pulverized, and each little particle of coal could be surrounded with a film of air on its way to the furnace, the combustion ensuing would be much improved. Many have been the devices to burn pulverized fuel in such a manner, but the success achieved has been but indifferent, and the difficulties besetting the problem have appeared almost insurmountable. A very promising effort in this direction is that of Mr. J. G. McAuley, of Lansing, Mich. Rumors of Mr. McAuley's work have from time to time reached the public, but it is only within a short time that his process seems to have been perfected. In order to satisfy certain capitalists of its merits the process has recently been applied to one of the puddling furnaces of the Chester Rolling Mills, at Chester, Pa. *The Iron Age*, on the alert for information on meritorious inventions, sent an expert to Chester to examine and report on the merits of this process. He went to Chester a professed skeptic, but after a close personal examination extending over four days he returned to Philadelphia enthusiastic in its praise.

The process is extremely simple. The coal is pulverized as fine as ordinary flour and in this condition is fed into the hopper of the machine. By means of ingenious but very simple mechanism it is fed from the bottom of the hopper at a definite and perfectly uniform, though readily adjustable rate, and is allowed to drop into a horizontal pipe, through which a blast of air is passing into the furnace. The fine coal dust becomes intimately mixed with the current of air and on entering the combustion chamber of the furnace the combustion is nearly instantaneous and, it is believed, practically perfect. Only enough air is admitted to secure complete combustion, thus avoiding the great loss due to the excessive amount of air necessarily admitted when burning lump coal on an ordinary grate. The heat produced is intense and well under control. The temperature of the flame, as well as its oxidizing or reducing character, can be well regulated. There is no smoke and the ashes are carried out of the top of the chimney in the shape of a fine invisible powder.

In the case at Chester the process was applied to one of the regular puddling furnaces, though still greater economy would probably be gained by using a special form of combustion chamber and furnace devised by Mr. McAuley. A prominent official of the Chester Rolling Mills said that since this process was applied they had saved over 25 per cent. in the quantity of fuel for this special furnace, that the time required for each heat was less, that the amount of muck bar produced from a given weight of pig iron was greater, and that the quality of the iron produced was somewhat better than when using the old method of burning lump coal. There is, however, an additional element of economy in the fact that the fuel to be used will be largely slack and coal waste, instead of the higher grade that must necessarily be used when burnt as usual on a grate. The result of the trial was perfectly satisfactory to the Chester Rolling Mills Company and they are about to adopt it for their entire works.

Arrangements are now being perfected to apply the process to a battery of boilers and have exact scientific comparative evaporative tests made by a committee of experts. These tests will be made on a large scale and with every measure of precaution known to expert engineers, and will give an exact statement of the efficiency (expressed in dollars and cents) of this process as compared with the ordinary method of burning coal. The importance of the invention (if, under an exact evaporative test, it proves as successful as is confidently anticipated) is great. No smoke, no cinders, a large reduction of fuel bills, no expense for grate-bars, the cost for handling fuel reduced to a minimum and that for handling ashes reduced to zero, the waste of iron in puddling reduced—these are the claims put forward.

In conclusion, it may be of interest to state that the coal is pulverized for this process by means of the "Cyclone Pulverizer," the principle of which is fairly indicated by its name. Within a closed chamber a pair of wheels resembling three-bladed screw propellers, revolve near each other at a great velocity, but in opposite directions. Two powerful currents of air in opposite directions are thus generated, their joint effect being to produce a miniature whirlwind within the chamber. Into the vortex of this inclosed cyclone the coal is regularly dropped and is rapidly ground to the finest powder by the mutual attrition of its particles. There is no grinding or pulverizing by the direct action of any of the metal parts of the machine, so that the machine does a great deal of work with but little noise and wear.

The result of the further elaborate tests above alluded to will be watched with interest by all engaged in industrial pursuits, and it seems probable that before long this process will be widely used wherever fuel is to be burned in large quantities.

The works of Oldbury, near Birmingham, England, for the manufacture of aluminium and sodium on a large scale, by the Castner process, are rapidly approaching completion, and it is expected that sufficient progress will have been made to start about March 1. They adjoin Chance Brothers' alkali works, and the muriatic acid required in the Castner process will be delivered by a pipe from the alkali works direct to the aluminium works, while the caustic soda employed in the production of sodium will also be obtained from Chance's works. Thus on two of the materials for the manufacture there will be no carriage to pay. The whole of the fuel employed will be gas, made in eight of Wilson's gas producers. According to *Engineering* the furnaces, of which there are 40, are calculated to produce 300 pounds of aluminium and 1000 pounds of sodium per day; but, as 900 pounds of sodium are required to produce the aluminium, there will only be 100 pounds of sodium available for sale. The aluminium will be produced in pigs, weighing about 2½ pounds each. As the present production of aluminium is probably only about 100 pounds per day, it will be seen that the Aluminium Company are taking time by the forelock in endeavoring to be prepared for the increased demand which will follow on the reduction in price of this metal. In the production of aluminium bronze for telegraph and telephone wires, and in the manufacture of Mitis wrought-iron castings, and in producing soundness in steel ingots, the use of aluminium has probably a future before it. Plant for the manufacture of chlorine by the Weldon process is also being erected on the works.

Puddling Blast-Furnace Metal at Milwaukee.

The North Chicago Rolling Mill Company continue to puddle blast-furnace metal at their Bay View works, near Milwaukee. They now have six double-double puddling furnaces in operation on this process. The following facts were obtained during a recent visit to the works: No change was made in the puddling furnaces which had previously been operated on pig iron except to put a trough on the side to run the liquid metal into the furnace from the ladle. The liquid metal is brought from the blast furnace into the puddle mill by a small locomotive. The track running to the blast furnace has been so arranged that the top of the ladle on the truck comes a short distance below the level of the pig bed in the casting-house. When the furnace is tapped for metal for the puddling furnace the stream runs down a very short distance across the side of the casting-house to the ladle. The ladle holds 4400 pounds, which is enough to charge two puddling furnaces. It has been found that the metal retains its heat sufficiently for a long time, so that there is no risk of damage if there happens to be a detention on the way to the puddle mill or some slight delay there from any cause. The ladle at present is mounted on a frame tilted by means of a gear wheel. It is the intention to mount this frame on a scale, so that the contents can be accurately weighed when pouring.

As a double-double furnace may be somewhat new to many of our readers, a brief description will not be out of place. A double-double furnace is simply a furnace having four times the capacity of a single puddling furnace. There are two doors on each side of the furnace, enabling four men to work at one time upon the metal within. These doors are so located as to be directly opposite each other, so that the four workmen are operating at one time at the same place.

The 2200 pounds of metal require about an hour for the complete process, making 10 balls. The time occupied for the usual five heats of a shift or turn is now just eight hours, which includes an hour for meals, making seven hours required for the usual work of a shift or turn. At present but two turns are made in 24 hours, but it is probable that in time three turns can be made, which will increase the output of each puddling furnace 50 per cent. There seems to be no special diffi-

culty about this process, and in fact it appears so simple that it is curious that some attempts have not been made to introduce it at other works so situated as to command a ready supply of liquid metal from their blast furnaces. The blast furnace itself seems to be working very well, although it is now being tapped once an hour for metal for the puddling furnace. The surplus metal is run off into the pig beds once a day, and the pigs that have been obtained so far appear to be of as good quality as before the direct puddling process was introduced.

Thus far a saving has been effected of about one-fourth of the fuel (Indiana block) used by the old process at these works. It is expected that the saving will eventually be greater than this when the workmen get thoroughly expert in manipulating the process. A saving is also expected in fix and in the lining, but sufficient data have not yet been obtained to make a showing on this point. The managers of the mill state that the metal obtained is much cleaner than that produced by remelting pig. This is, of course, due to the fact that pig iron takes up a great deal of sand from the beds in the casting-house, and this sand represents an important addition of silica in the puddling furnace. In the course of two or three weeks further information is promised regarding the economy of the operation, as well as a report of tests of the bar iron made from the metal produced by this process. The muck bar works very well in the rolls and seems to be of as high quality in that respect as could be desired. The piling and further rolling into finished shapes were inspected, and at no stage of the operation did there seem to be any trouble experienced from the introduction of the new process.

To what extent the prominence of New York is due to the Erie Canal is indicated by a few figures: Last year during the seven months of navigation the canal brought to this city 46,000,000 bushels of grain, while the railways together only gave us 50,000,000 bushels for the entire year, and less than 1,000,000 bushels came by coastwise vessels. Philadelphia received in 1887 from all sources only 17,671,031 bushels, Baltimore 24,074,804 bushels and Boston 17,057,062 bushels, making a total of 58,802,897 bushels. But for the canal New York would have fallen behind these three ports 7,000,000 bushels. With it we are in advance of all those cities put together 38,696,245 bushels. Another effective way of stating the case is as follows: During the season of navigation last year the receipts of grain at the seaboard were:

	Bushels.
At New York city	74,563,000
At other great competing points	33,119,000
Excess at New York	41,444,000

The receipts during the period of suspended navigation were:

	Bushels.
At New York city	22,946,000
At competing points	25,684,000
Excess for competing points	2,738,000

Here the influence of the canal is strikingly illustrated.

As a measure of the extent of the business of the well-known English P. and O. Steamship Company, the following particulars, from an English source, will prove interesting: The company own 53 steamers, with an aggregate registered tonnage of 204,183 tons and 198,500 horse-power, built at a cost of some £6,000,000. Their largest steamers are of 6500 tons register and the smallest 2000 tons. In the course of the coming year no fewer than 200 of their steamers, of an aggregate tonnage of nearly 1,000,000 tons, will enter and leave the port of London alone. The steamers traverse 2,500,000 miles in the course of a year. The company give employment to 800 officers (commanders, officers, engineers, surgeons, &c.) of the mercantile marine holding certificates from the Board of Trade, and a large proportion have her Majesty's commission in the Royal Naval Reserve. They have also in their service an army of nearly 15,000 people afloat and ashore. Great as are their resources and operations, the competition of the cheap class of cargo steamers, with limited passenger accommodation, which have lately been built, has forced the company to extend their branches, and of late they have established a network of agencies throughout the country.

E. P. Allis & Co.'s Works, at Milwaukee, Wisconsin.

The works of E. P. Allis & Co., at Milwaukee, Wis., are among the largest in their line in the United States. They manufacture flour-mill and saw-mill machinery and do a great deal of general machine work, but pay much attention to the building of engines for heavy service. The blast-furnace and rolling-mill engines which they have completed are found in some of the most important establishments in the United States. The past year has been a very busy and very eventful year for them. On the 7th of January, 1887, quite an important part of their Reliance works was destroyed by fire, including the foundry, erecting shop and two machine shops. Coming at a time when the firm were pressed with orders, they experienced a great deal of inconvenience, being compelled to send a large part of their work to establishments at remote distances in order to insure its completion in the time in which they had contracted to deliver it. By this time they have repaired all the damages of the fire and have increased their facilities beyond those then existing, but still find that they are not able to catch up with their orders, and are compelled to call on outside establishments to some extent.

Their works now embrace three separate plants. The Reliance works is the largest and most important, covering an entire block. The Bay State works, situated some distance away, is the next in size. The third is the foundry formerly owned by J. A. & P. E. Dutcher, which was purchased in 1887 by E. P. Allis & Co. after the Messrs. Dutcher concluded to give up the business of manufacturing stoves. The main office is located in connection with the Reliance works and occupies a conspicuous position in the block. It was built last year and has only been occupied since the beginning of the winter. It covers a space 320 feet long and 60 feet deep, is four stories high and is built of cream-colored brick. The first floor is devoted to shipping and receiving the smaller class of machinery and supplies; the second floor is used for the general offices and drafting rooms, the third floor consists of the wire storage-rooms, such as bolting cloths and other wire goods, as well as general supplies; the fourth floor is partly used for storage purposes and the blue print photographic department, and it also contains a large dining hall furnished with 12 long tables and a complete kitchen and pantry, with the intention later on to furnish dinners to all employees who desire them. Each floor is equipped with large and capacious vaults for storage of valuable material. The building is very light and the ceilings are very high. The general offices on the second floor have a hardwood finish in cherry and maple, including the walls and ceiling. The erection of this entire building and all the woodwork and finishing, even to the gas and electric light fixtures, were done by the regular workmen in the employ of the firm. The offices will be furnished with desks to correspond with the woodwork, which are now being prepared in the shops.

The new foundry built to take the place of the one destroyed by fire is 318 feet long by 120 feet wide and has a hight of about 50 feet to the roof timbers. For lifting work two Yale & Towne traveling cranes of 20 tons lifting capacity each have been introduced, that travel the entire length of the building. Adjoining the foundry is a new erecting shop, 180 x 140 feet, with a traveling crane of 30 tons capacity. West of the erecting shop is a new two-story brick machine shop, 80 x 120 feet. These buildings complete the north two-thirds of the Reliance works. They are as nearly fire-proof as can be built. At the south end of the works, where there was a line of two-story frame machine shops, a third story has been erected since the fire. This line of shops extends 200 feet on Clinton street and 300 feet east. The three plants have an area covered by buildings of over 12 acres. They now employ about 1300 men operated in double crews, day and night, keeping the machinery in active operation 22 out of 24 hours. They have a daily melting capacity of about 160 tons of pig iron.

The business men of Milwaukee are awaking to the fact that the advantages of their city for manufacturing have not been properly represented to the people of other sections of the country. They have a very choice location for both water transportation and railroad connections with other parts of the country, and occupy a commanding point for the trade of the great Northwest, yet they have observed other towns with fewer advantages improving rapidly in building up manufactures. There is a movement on foot to remedy this. A committee have been appointed by the local board of trade to devise measures for acquainting the people of the country generally with the advantages of Milwaukee, and the possibility is that they will offer inducements to manufacturers of other localities to transfer their enterprises to that city. They have a very important fact in their favor, which is the rapid growth of the establishments that are already located in Milwaukee. A number of these are among the largest in the United States, and they are so crowded with work that they are at the present time greatly extending their facilities.

The Dominion of Canada, in order to stimulate the development of its iron deposits, offers a bounty of $1 per ton on all pig iron made in Canada. At the coming session of the Dominion Parliament, an effort will be made by the companies owning Canadian copper deposits to secure similar legislation for the encouragement of copper smelting in Canada. It is intended to ask for a bounty on every ton of copper matte produced assaying 50 per cent. copper or less, an increased bounty for higher grade mattes and still more for bar copper, with a subsidy per mile for any railroad built by the companies to connect copper mines with smelters or tide-water. The companies principally interested are the Canadian Copper Company, of Cleveland, Ohio, owning the Sudbury deposits on the Canadian Pacific railroad; G. H. Nichols & Co., of New York, owning producing mines at Capleton, and the Eastern Development Company, Limited, owning the Coxheath deposits. The latter company have just received a letter from Sir Charles Tupper on the subject, arranging to meet representatives from the various companies at Ottawa immediately after the opening of the Dominion Parliament, which takes place on the 23d inst.

The Copeland Steam Engine.

Now that so much attention is given, especially abroad, to the driving of bicycles and tricycles by steam and electric power, with the view of adapting them to purposes of usefulness and not only pleasure, it is of interest to note that the Northrop Mfg. Company, of Camden, N. J., are turning out a small steam engine and boiler which appear to meet all the requirements of the case. The engravings which we present will give an idea of the design adopted and of the manner in which the outfit is applied to the propulsion of the machines in question. It will be noted very quickly, we think, that foreign designs thus far developed for the same purpose will scarcely bear comparison with those which we illustrate in point of weight, if indeed not efficiency, the element of weight itself being of great importance. The whole outfit is built according to the designs of Mr. L. D. Copeland and for a 2 horse-power engine, including fittings, we are told, weighs only 100 pounds. The fuel used is gasoline.

In our engravings Fig. 2 shows the boiler and engine fitted to the steering rod or bone of a Star bicycle, the large upright part being the boiler; the globe-shaped piece, the water-tank; and the diagonal parts the oil-tank and engine. The latter has a $1\frac{1}{16}$ inch cylinder with 3-inch stroke, and is furnished with Meyer's cut-off valves. It can be made to cut off the steam at any part of the stroke by turning a small hand-wheel. On the outer end of the shaft of the engine is a grooved wheel 4 inches in diameter, from which runs a round belt, $\frac{3}{8}$ of an inch in diameter, to a grooved rim, 36 in inches diameter, soldered to the spokes on one side of the large wheel of the bicycle. Underneath the 4-inch wheel, it will be observed, is another small wheel which is used to tighten the belt. The burner, for the oil, is located in the lower part of the boiler. A small rod running down serves to regulate the amount of heat required, and permits of its operation from the saddle while the machine is running. The throttle valve is attached to the brake-lever. When the lever is allowed to go down, the throttle is opened, and when it is brought up the throttle is closed and the brake is applied to the large wheel. The machine is provided with a headlight, whistle, safety-valve, &c., and, Mr. Northrop tells us, has frequently been run with a steam pressure of 100 pounds, and at a rate of 10 miles per hour, on smooth and level ground. A supply of fuel to last for several hours can, of course, be carried if the capacity of the tanks be increased. In ascending a hill the usual treadles can be used to assist the engine. The engine shown in Fig. 2 will develop one-half horse-power.

In Fig. 1 we show a tricycle fitted with a two-cylinder engine. In this the boiler is located directly back of the rear seat. The cylinders are horizontal on the reach or backbone of the machine, and are connected to the balance gear on the main axle of the driving-wheels by noiseless gearing. They are immediately back of and below the water tank, in full view of the operator. In appearance they resemble a pair of extended opera glasses and weigh but 6 pounds. The tank, which is divided into compartments for water and oil, is situated under the forward seat. The driver occupies the rear seat and controls the machine by means of the brake-lever, which is attached to the throttle in a manner similar to that of the steam bicycle. The machine will start without jumping or jarring and attain its maximum speed as the lever is raised to its highest point. Throwing down the lever to its lowest point cuts off the steam and applies brake. The water and fuel supplies are entirely automatic. Enough fuel is carried for a run of 25 miles. The entire weight of the machine with tanks filled is given as 185 pounds. There is, it is claimed, no more danger of frightening horses than with the

Fig. 2.—Steam Star Bicycle.

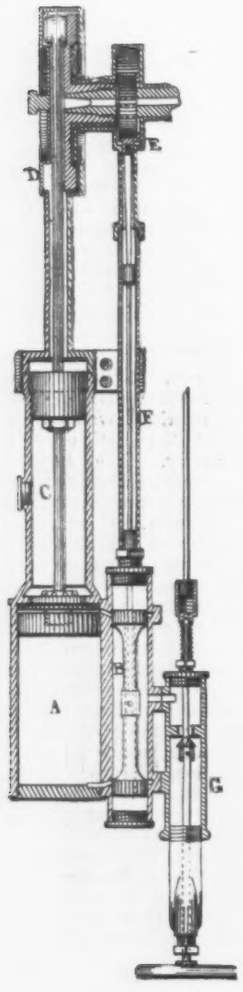


Fig. 3.—Vertical Section of Engine.

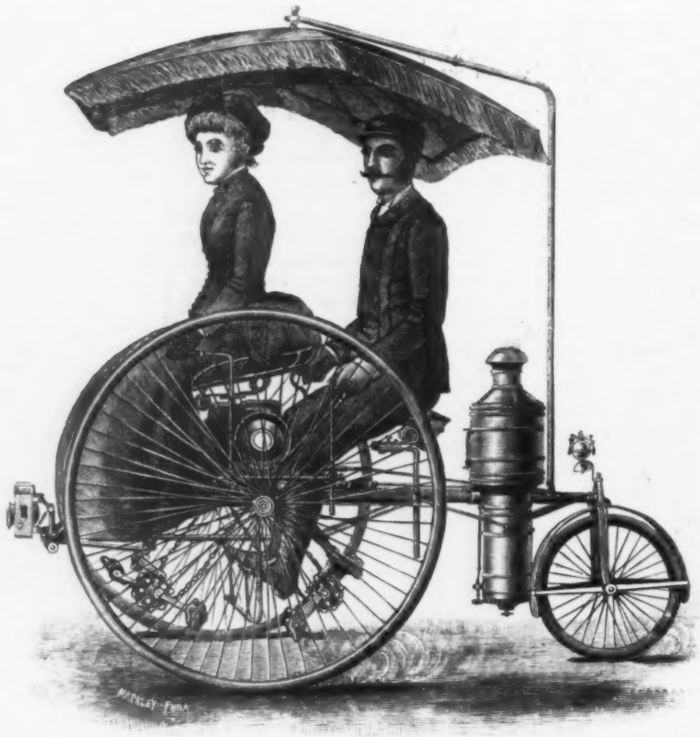


Fig. 1.—Steam Tricycle.

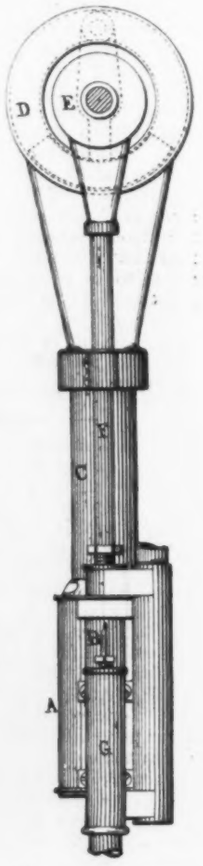


Fig. 4.—Side Elevation of Engine.

THE COPELAND STEAM ENGINE, BUILT BY THE NORTHROP MFG. COMPANY, CAMDEN, N. J.

ordinary tricycle, as there is no noise of escaping steam and no smoke or odor from burning oil.

The Northrop Mfg. Company will shortly place upon the market a 2 horse-power Copeland stationary engine. This is an automatic, petroleum, vapor-burning, safety engine, designed for use in pumping water, running ice-cream freezers, lathes, blowers, polishing wheels, dynamo-electric machines, air pumps, printing presses, churns, choppers, &c. The petroleum is supplied from a tank, by gravity or by pump, to an improved form of retort burner, in which it is converted into vapor, forced into the fire-chamber and ignited. The fire can be started at once, independently of the pressure in the boiler, but, when started, is regulated automatically by that pressure.

The water level is maintained by a float regulator governing the supply-cock of the pump and sounding an alarm should the supply in the tank become exhausted. Should this fail, an extra precaution is taken by the insertion of a plug, which will be released after the water passes a given level, when the pressure in the boiler will expel the water remaining, putting out the fire. The speed of the engine is controlled by a new form of governor contained within the fly-wheel. Figs. 3 and 4 show some of the details of construction. Thus, A is the cylinder, B the steam-chest, C the cross-head cylinder, D the crank casing, E the eccentric casing and F and G the valve-connection casing. It will be noticed that all the moving parts of the engine are inclosed, preventing the leaking out of lubricating oil and also keeping out all dust. The engine will thus remain free in its action and will not be clogged up by foreign matter, only requiring the usual oiling. The hand-wheel shown in Fig. 3 is turned by the operator in either direction when starting or stopping the engine, and operates the throttle-valve. This valve is also the governor-valve. Fig. 5 shows the engine and boiler complete for stationary purposes. The engine is constructed to run at a high speed, all moving parts and bearings being made of steel, hardened and ground by special machinery and constantly moving in oil. The wear is thus almost imperceptible.

The boiler is ingeniously constructed, consisting of several upright tubular compartments, A (see Figs. 6 and 7), arranged around a central tubular compartment, B, and having inside fire flues *a a*. Depending from the bottom of each of these outer compartments are three drop water tubes, *a' a'*, which extend into the fire-chamber. Leading from each of the outer cylinders at their tops into the dome or central cylinder B are curved connections, C C, which are fastened at one end in the wall of the dome and are united by couplings *c c* at their other ends to the outer compartments, so as to permit of their ready removal in case of accident from any cause. In the center of the compartment B and surrounded by the fire flues *b b* is a tube, D (see Fig. 8), firmly secured in the bottom

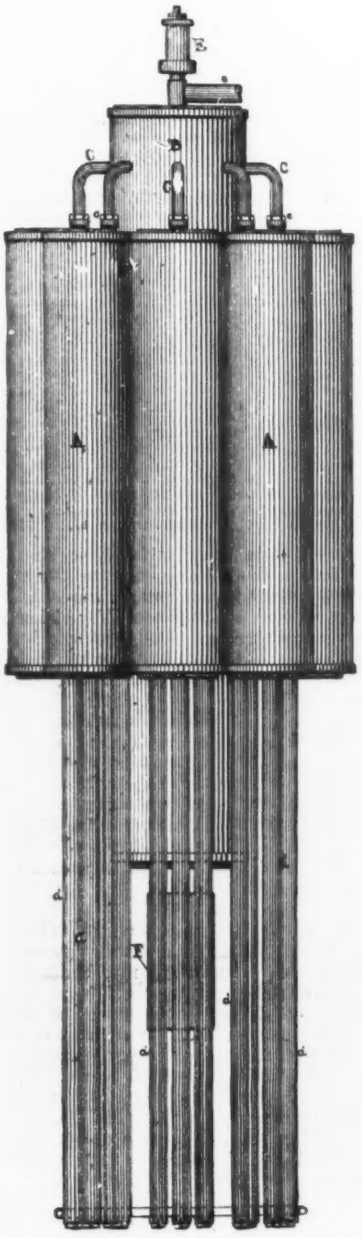


Fig. 6.—Elevation of Boiler with Casing Removed.

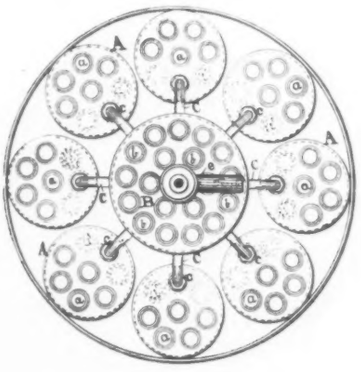


Fig. 7.—Cross Section of Boiler.

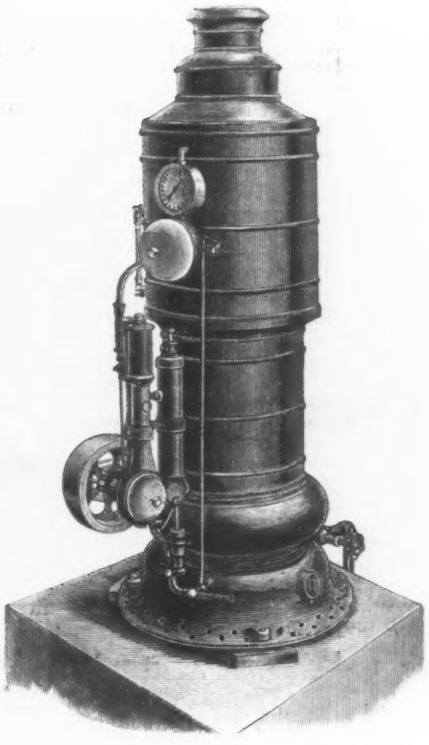


Fig. 5.—Stationary Boiler and Engine.

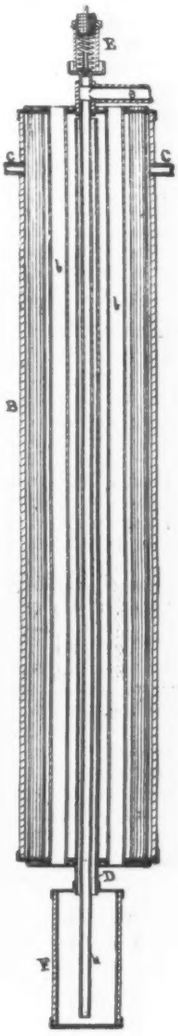


Fig. 8.—Vertical Section of Central Tube of Boiler.

THE COPELAND STEAM ENGINE, BUILT BY THE NORTHROP MFG. COMPANY, CAMDEN, N. J.

of that compartment and extending upward to within a short distance of the top. On the inside of the tube D is another and smaller tube, *d*, which is secured at its upper end in the base of the safety valve E and extends downward into a drum, F. The latter serves as a super-heater for the steam, which is admitted at the top of the tube D and passes down into the drum. Thence it passes up through the tube *d*, and finally through the steam pipe *e* to the magazine. The drum F is secured to the lower end of the valve D, and depends from it into the fire-chamber. This construction of boiler gives a large heating surface, good circulation, and consequently even and rapid generation of steam.

Petroleum of from 110° to 150° fire test can be purchased at from 5 to 10 cents per gallon, and 4 gallons, it is claimed, will be sufficient to run a 2 horse-power Copeland engine, doing full duty for ten hours. The weight of the 2 horse-power engine and boiler complete is but 100 pounds. No smokestack is required or heavy foundation needed. It is said to make no more noise in running than an ordinary sewing machine, and it obviously requires but little skill on the part of the attendant. The engine, we understand, is shortly to be turned out in a modified form for boat propulsion, and seems to offer a number of advantages for this purpose over some of the existing types of motors.

Resistance in Tube Plates of Boiler Tubes With Taper Ends.

We find in the excerpt minutes of the proceedings of the British Institution of Civil Engineers an interesting record of some experiments which were made in Germany some time ago with the object of testing the resistance of boiler tubes with taper ends forced into the tube plates. Five wrought-iron tubes were supplied for the purpose, which were forced into wrought-iron plates, bolted to, and closing up the ends of a cast-iron pipe. Each tube was strengthened at both ends by a ring brazed on and turned taper on the outside, so that the outer surfaces of the two rings on each tube formed part of the same cone. The joints were made tight against an internal pressure of 15 atmospheres by means of a tube expander. In the first series of experiments the projecting ends of the tubes were not enlarged, in the second they were. The prepared test-piece was placed in the Werder machine in such a manner that at one end pressure was applied to the cast-iron pipe, at the other to the wrought-iron tube. With ends not enlarged, the mean force required to push out the tubes was 15,211.7 pounds; the maximum, 18,739.1 pounds; with enlarged ends the mean resistance was 20,943.7 pounds, showing an increase of 37 per cent. The outside diameter of the smaller end of the tubes tested was about 3.05 inches; this was measured on the taper-ring. The diameter and thickness of the actual tubes themselves are not stated.

Those who use tin plate for tinware or even for roofing purposes have an imperfect conception, perhaps, of the many uses of this material in other directions. Every one who uses tobacco has perhaps noticed that certain brands of this article are designated by tin tags; but no one would stop to think, in all probability, that such a use of the material would require any very large quantity. The facts of the case, however, warrant a very different conclusion. We learn that a manufacturing establishment in Cincinnati has recently been awarded the contract from a well-known firm of tobacco manufacturers for 125,000,000 tobacco tags. This, it is estimated, will require some 1250 boxes of 14 x 20 plate. The approximate weight is given as 144,000 pounds, while the number of squares of roofing that would be covered by the same quantity would be in the neighborhood of 2700. The cost of the material, cut and delivered to the tobacco manufacturers, is considerably less than $10,000. This represents a single concern, and is only one of numerous cases of a similar character that might be cited.

Factory Mutual Insurance.

A suggestive series of documents are the annual reports of the Associated Factory Mutual Insurance Companies of New England, and of the Boston Manufacturers' Mutual Fire Insurance Company. The following is a summary of the business of the former company in 1887:

Net amount of risks taken	$442,171,026.00
Premiums received in cash	4,115,001.23
Returned on Policies canceled	161,587.53
Losses incurred	605,539.14
Premiums on policies terminated in 1886	3,763,203.41
Dividends returned on said terminations	2,667,154.88
Losses unpaid	10,063.07
Cash assets, at market value, January 1, 1887	4,348,171.11
Amount at risk December 31, 1886	441,610,526.00

As illustrating the advantages of factory mutual insurance, the report says:

The practically concurrent action of all the mutual companies and the establishment of regular quarterly inspections began in 1878. In 1879 the conclusion was reached that the increase of property at risk in almost all mill-yards called for additional safeguards, which were steadily called for until nearly all were thoroughly guarded on the present standard in 1883. The greater part of our risks having been brought to the present standard of what is considered adequate protection in the year 1883, our members have had a right to expect an increase in the percentage of their annual dividends, even though a concession in the rates of premium, varying from 5 cents to 25 cents per $100, has been made in consideration of the additional safeguards called for. Too much clerical work would be called for to determine the exact sum of the concessions in the rates of premium; it is computed at not less than $1,750,000 during the last nine years. Had this sum been paid in, it would all have been returned in the form of dividends. The average of the reduced premiums charged during the last three years has varied but a fraction from 90 cents on each $100 insured. The gain in dividends has been as follows:

	Premiums on expired policies.	Dividends.	
1884	$3,047,008.81	67.20 %	$2,047,328.55
1885	3,259,548.32	74.12 %	2,416,419.04
1886	3,485,827.86	77.71 %	2,708,867.50
1887	3,763,203.41	70.88 %	2,667,154.88
Total	$13,555,588.40	72.59 %	$9,839,769.97

Dividend on all Companies up to December 31, 1878, average	60.925 %
Dividends on all companies 9 years since December 31, 1878, average	68.72 %
Dividends on all companies 1884, 1885, 1886 and 1887, average	72.59 %
Dividend on all companies 1887, average	70.88 %

It may be safely assumed that the reduction in rates from what they had been, or from what would have become necessary without the additional safeguards, has more than paid the cost of the additional apparatus. The sum of the increase of dividends on the lower rates charged since 1878, at 9.955 per cent., on $25,032,132.14 premiums on policies terminated Jan. 1, 1879, to Dec. 31, 1887, is $2,491,948.74. The total gain to all members from the concession in rates estimated at $1,750,000, and the actual gain in dividends, $2,491,948.74, may be computed at $4,241,948.74.

The Boston Manufacturers' Mutual Fire Insurance Company, of which Mr. Edward Atkinson is president, was carrying risks on Dec. 31, 1887, of $84,874,181, a gain of $8,137,216 during the year. Its income from premiums was $716,259.85 and from interest $25,352.05, a total of $741,611.70. The losses were $92,820.56, and the dividend or premium returned was $489,061.14. The company has net assets of $698,010.29. The average cost of insurance for 37 years has been 20.43 cents annually on each $100 of risk taken.

A very interesting report by C. J. H. Woodbury, second vice-president, is made on the results of protection by automatic sprinklers which we print below:

Year.	Without Automatic Sprinkler Protect'n			With Automatic Sprinkler Protect'n		
	Fires.	Claims.	Losses.	Fires.	Claims.	Losses.
1877	44	32	778,886.95	2	None	None.
1878	62	26	233,535.26	5	None	None.
1879	45	17	50,803.32	3	1	512.77
1880	80	30	775,008.86	5	2	1,192.72
1881	76	31	464 883.03	7	3	1,345.40
1882	120	32	866,873.93	15	5	1,567.67
1883	70	23	482,980.91	23	8	20,582.34
1884	56	36	657,126.29	34	13	8,976.51
1885	78	28	335,033.13	16	8	4,748.12
1886	82	32	702,916.99	50	15	19,704.89
1887	46	37	358,665.49	46	26	29,006.75
Totals	759	324	5,706,723 66	206	81	87,637.47
Average Fires			7,518.87			425.42
Av. Claims			17,613.34			1,081.94

It will be noticed that $42\frac{7}{10}$ per cent. of the fires without automatic-sprinkler apparatus, and $39\frac{4}{10}$ per cent. of the fires with such protection, are followed by claims for indemnity, the practically identical proportion in each instance showing that the methods of obtaining the information are alike in both classes of fires. The company record of every fire starting under automatic sprinklers, as far as can be obtained, whether insured in the Factory Mutuals or not; the loss by fire list now comprises 469 such fires, with an average loss of $397.97—an amount which is largely in excess of the average loss by fire under the present type of sensitive automatic sprinklers.

Parties in Philadelphia and Chicago speak confidently of a grand scheme for introducing natural gas into Chicago by means of steel pipes from any point within a radius of 200 miles, wherever gas can be found. The prospect of success, in their judgment, depends wholly on the invention of W. H. Brown, of New York, by means of which steel pipes of the largest diameter can be made. Mr. Brown, in describing the process to a reporter, said: "A disk of mild steel is first taken and folded under heat. It is drawn cold over mandrels into tubes and rolled and worked by specially constructed machinery into any required length and thickness. It is cleaned by acids, and a proportion of tin is applied to the inside, which penetrates the fiber of the steel and increases its tensile power one-fourth. The product is very much like steel wire. The extraordinary qualities of temper and strength which inhere in the steel produced by this process render it applicable to almost every form of the iron manufacture. It will be made, when the works are started, into tubing of every size, shafting buckets, belts, soda-fountain receivers, boilers, cans, gun barrels, lamp posts, &c. The company will be incorporated in a few days, with a capital of $1,500,000."

The Sheffield Velocipede Car Company, of Three Rivers, Mich., are discussing a possible removal of their shops to Elkhart, Ind. A committee of citizens of the latter place have made them favorable offers.

Some New Specialties for Testing Machine Use.

Messrs. Riehlé Bros., of Philadelphia, Pa., have brought out a number of new devices to facilitate and add to the accuracy of testing work. The engravings which we present on this page will serve to give a fair idea of their construction and manner of working.

Fig. 1 represents a gauge for measuring minute extensions of specimens without the limit of elasticity. It consists, as shown, of a graduated micrometer screw reading in thousandths up to one inch and having pointed extension pieces attached for gauging the distance between the small projections on the collars, which are fastened to the specimen at the proper distance. These collars are partly self-adjusting by the springs, which help to centralize them. They are clamped in place by means of the pointed set screws on the sides and measurements are made between the projections on opposite sides of the specimen and compared to denote any changes in shape or variations in the two sides. These gauges can be made six, eight or ten inches in length, or can be provided with interchangeable points to suit all three. They are in use at the United States Naval Academy, at Annapolis, Md., and at Messrs. Riehlé's Physical Testing Laboratory, at Philadelphia.

The vernier for measuring elongations, shown in Fig. 2, consists of a bar of three-eighths square metal, properly secured to the column casting, and upon it slides an adjustable vernier, which can be set to any point. A scale is attached to the cross head of the machine in such a manner as to read properly with the vernier. When a specimen is set and the wedges have secured a solid grip the vernier is adjusted and the reading taken. Subsequent readings can be made at any required pressure, thus securing the elongations corresponding to those points. The scale B is secured to the movable cross head of testing machine by screws (shown in the cut); A is a bar of iron fastened to the frame of the testing machine by screws at *a* and *b*. The vernier is adjusted on the scale B and secured by the clamp and screw C to the bar A. This device is now in use at the Union Iron Works, at San Francisco, Cal.

Fig. 3 represents a steel gauge with parallel-side slots, with corresponding sides exactly 1 inch apart. It is used for laying off specimens to observe the elongation in different parts of flat or square test pieces. On the under side is a shoulder bracket for keeping the slots at right angles with the edge of the test piece while marking. In using, the shoulder is placed against the edge of the test piece, held firmly in place with the left hand, and with a sharp-pointed piece of steel a line is scratched across the piece, being careful to use corresponding sides of the slots. This will give lines exactly 1 inch apart and at right angles to the center line.

In Fig. 4 we show a steel double-pointed punch, with points exactly 1 inch apart. It is used for round, flat or square test pieces, by drawing a center line and prickling off the inches on it, thus giving an opportunity of observing the elongation in different parts of the test piece. All these appliances, we are told, are in daily use, and have successfully demonstrated their practical value.

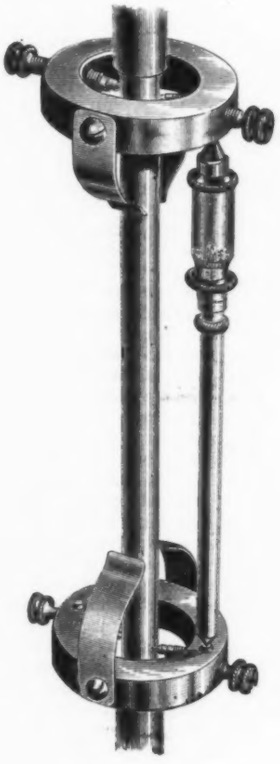


Fig. 1.—Micrometer Gauge Extensometer

Fig. 3.—Laying-Off Gauge.

Fig. 4.—Double Pointed Center Punch.

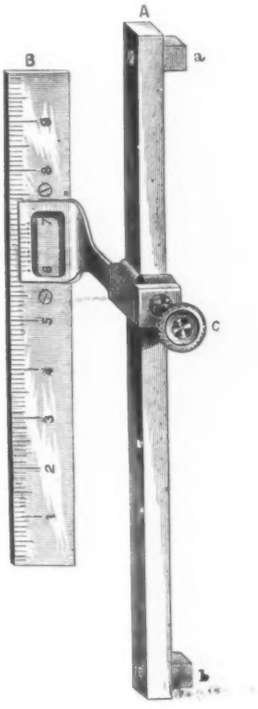


Fig. 2.—Vernier for Measuring Elongations.

NEW SPECIALTIES FOR TESTING MACHINE USE, MADE BY MESSRS. RIEHLE BROS, PHILADELPHIA, PA.

More than 2000 electric lamps are now in use in the coal mines of England. It is many years ago that it was suggested that coal mines should be lit by electricity, but the use of portable lamps for this purpose has only recently been introduced. There is a disadvantage attending the use of incandescent lamps in mines, inasmuch as they offer no indications of the presence of fire damp. It has been found, however, that a red hot platinum wire glows more brightly in air contaminated with fire damp than in pure air, and this fact has been recently utilized so as to afford a convenient indicator for the presence of fire damp in mines. As the wire can be heated by the current from the same accumulator as supplies the lamp, no additional energy or expense is incurred, and we learn that from experiments with this apparatus much better and more reliable indications are afforded of the presence of an explosive mixture than when a Davy safety lamp is the only guide employed.

The experience which has been gained in the matter of protective coatings for the interior of iron and steel ships might be applied to advantage in many other directions, as, for example, in the preservation of corrugated iron roofing, which ordinarily is a very short-lived affair. A good coating is found in a combination of Portland cement and pine tar. The surfaces to be treated must be dry and clean and free from rust. The tar is then put on in a good coat and sprinkled with dry Portland cement in fine powder until as much has been put on as will adhere. The cement absorbs the tar and slowly sets, forming a hard and waterproof skin.

For cleaning greasy machinery steam has recently been emphatically commended. It is claimed that a steam hose attached to the boiler can be made to do better work in a few minutes than any one is able to do in hours of close application. The principal advantages of steam are that it will penetrate where an instrument will not enter, and where anything else would be ineffectual to accomplish the desired result.

Indian railways are now experimenting with a view to using petroleum as fuel on their locomotives. The cost of adapting the engines for this purpose is stated to vary from about $250 to $400 per engine.

Invention and Skill.

In the last issue of the *School of Mines Quarterly* Mr. Francis H. Richards discusses invention and skill as follows:

The judicial definition of invention, as distinguished from mechanical skill, seems not only inadequate, but, to some extent, erroneous. Authority concedes genius to the inventor, while only crediting the mechanic with the work of his hands. But from the mind spring the works of both inventor and mechanic; and, while their works are different, these are not to be distinguished by the absence or presence of thought.

In a recent case a circuit judge said: "Invention requires thought, mechanical skill does not. The one is the result of mental, the other of manual action." Though terse, this is ambiguous. For, what is invention, and, much more, what is "thought"? Surely it must be admitted that even the exercise of skill involves "the act of thinking," so that the "thought" said to be required for invention must be thinking under some limitation. Sometimes, as by Webster, thought is defined as "the exercise of the mind in any way except sense and perception." This is probably the meaning adopted in the quotation. But, even when thus limited, the definition is inadequate, and most clearly so if in the term "mechanical skill," we include the skill of the artisan—or any skill above that of the laborer.

It is easy for those living in the world of words, for the judge on the bench and the scholar in his study, to imagine themselves using a higher order of thought, thought *per se;* to imagine the mechanic has, in the practice of his art, no use for those higher cognitive faculties—comparison and reason. But let the theorist familiarize himself with the handicrafts, and especially let him attempt to practice the art, for instance, of the machinist, and this illusion will quickly vanish. If they who have analyzed and set down in order the special faculties, and nicely discriminated the operations of the mind, and have given the modes and limits of thought as thought—if these will study but for an hour the operations of a modern machinist, they will find exhibited not only sense and perception, but also imagination, the faculty of relations and reason—all the kinds of mental action employed by themselves, or by the inventor. It is not by thought that the mechanic plans and arranges the operations for finishing a forging? How, if not by reason, "mental action," reflection and judgment, does he arrange and time the steps of his processes so that each step shall be completed without interfering with the result of some other step? The truth is, his every step is carefully considered in the light of past experience; the conditions of that experience and those of the case in hand are observed and compared; and reason, judgment, decides in what and how far the old process shall be modified to suit the new circumstances.

The object, that about which the knowing subject is conversant, rather than the mode of thought, is to be considered in distinguishing invention from skill. It is doubtless true, as pointed out by the advocates of the thought theory of invention, that the object of invention when reached is perceived instantly; that the inventor does not, as a rule, consciously follow out step by step a course of reasoning leading thereto. But this phenomena of instantaneous perception does not seem to be at all peculiar to the thinking involved in the exercise of invention, but to be common to the ordinary exercise of thought, whatever may be its object. The mechanic no less than the inventor, seeking to know how to produce in a given case a particular result, brings thought to bear on the problem, and the object, when it is reached, stands instantly revealed to his mind. In all this thought is very like sight. The eye looking through a glass unadjusted sees but darkly, but as the lenses are brought to the proper focus the objects in the field of vision spring into clear view. In similar manner the inventor or the mechanic studying a problem sees at first but a chaos of possibilities, until finally the object of his thought flashes into the field of his mental vision. Then he sees no longer darkly, but face to face, yet all thoughtless of the mental processes involved in the illumination.

What, then, is the object, and what is the nature of invention? Like skill, it is incorporeal and invisible except through its embodiment, while both are mental faculties the exercise of either of which involves thought. How, when comparing a new structure with an old one, shall we know whether the improvement is due to invention or to skill; whether it is the result of skillful thought or of inventive thought? A definite and correct solution of this problem is not only of interest, but of practical importance, since presence of invention is the first requisite to patent ability.

Invention, as exercised in the mechanic arts, is the making original discovery, for and to one's self, of a process. Process is defined to be chemical or mechanical procedure; certain steps or elementary operations taken or performed in a certain order of succession, and each contributing to one final result. Processes may be classified as simple, compound and complex. A simple process consists of two or more simple steps; a compound process, of two or more processes, one following the other, but each complete in itself; a complex process, of two or more steps of which one (or more than one, but less than all) is in itself a process. Necessarily a process is unchangeable. If any step is omitted, or if substitution is made of one step for another, we have not a modified process, but a different one—either new or old, as the case may be. But processes, may, nevertheless, be modified, quantitively and qualitatively; one or more of the steps may be increased or diminished in time or force, in relation to other steps; this is the work of skill. A process may exist in three forms, or tenses, accordingly as invention be exercised in making discovery of the process *per se* (present tense); of a product of the process (past tense); or of means whereby the process may be carried out (future tense). Whatever the form the object of invention appears always to be the same, namely, process; and hence newness of process is the test of invention.

Planning merely, even though it be of a new structure, is not invention. For instance, a plan may be made of a new arrangement in a machine of an old combination, and yet the combination as such remain unchanged. This merely cannot be invention. And yet there may be involved in the production of such a plan not only consummate skill, but also the highest order of thought. To this class belong very many of the modern improvements in machinery, which are none the less useful because not invented.

Contriving a means (machine or apparatus) for carrying out a process is not necessarily invention nor the means contrived an invention. But in such contriving there may be made a combination which shall carry out by itself a new process (certain mechanical procedure) that is contributory to the object-process of the machine. This adjunct process is the object-process of such combination considered as a separate or sub-invention.

Practically considered, invention is the making original discovery for and to one's self of the subject matter, or of means for carrying out, or of the product of, a process. Invention is conversant about discovery of process; skill, about the practicing of processes. Invention is a pioneer who reaches out into the borders of the unknown, and marks out a new pathway to some point either before known or by him made known. Skill, on the other hand, dwells with her servants, power and industry, within the limits of the explored country, nor steps aside from the beaten way; she multiplies over and again the things that were made, and rears the works of her hands throughout the widening realm of the conqueror, Invention.

Water Hammer in Steam Pipes.

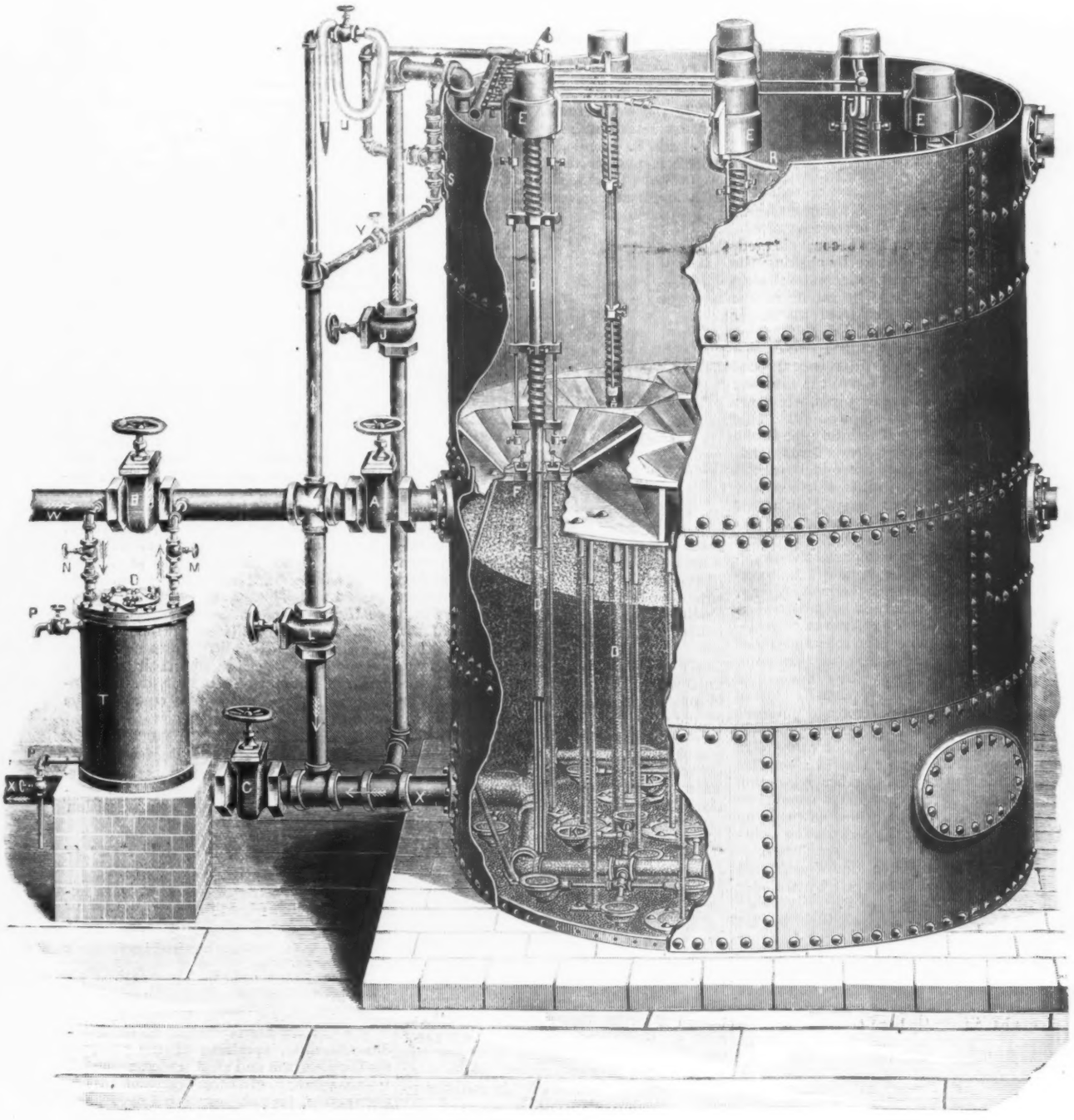
What is known as water-hammer action is familiar to every one who has had to do with the use of water for heating purposes. The astounding noise, the violent shocks, the excessive vibrations which are set up if a little steam is formed and is then condensed in the pipes, are but too well known. Another instance of water-hammer action is supplied when boilers are blown down, or when scumming takes place, so that steam shall pass into the sea outside. A large ship will shake from stem to stern at such times, cabin doors will open and shut, crockery will go adrift, and the noise made by the water fighting its way into the vacuum and the steam trying to get out, and being condensed in the act, echoes through the ship. Scumming is known to be positively dangerous from the way in which it shakes the boilers, bringing the scale off the tubes in flakes on to the furnace crowns, where it adheres in such quantity that they subsequently become red-hot and come down. Several years ago a curious experiment was tried by an English engineer. He took a large funnel fitted with a stop-cock and screwed the pipe into the top of a boiler containing steam of about 40 pounds pressure. He then filled up the funnel with cold water and opened the stop-cock. It would naturally have been predicted that the steam would have blown all the water out of the funnel. It did nothing of the kind. On the contrary, the water rushed into the boiler. As a result of this and several other experiments a boiler feeder was designed and patented and worked with tolerable success. It was found, however, that it was not certain in its action, and, the injector coming into high favor at the time, the inventor spent no more money on his ingenious idea. The inrush of the water was due to the fact that the steam condensed in the long pipe of the funnel and "water-hammer" action then drove the water into the boiler. Practically just below the cold water there was always a vacuum into which the water was driven by its own weight and the pressure of the air.

In a paper contributed to the Royal Society of Edinburgh, Mr. A. Crichton Mitchell gives the results of an experimental inquiry, made at the Edinburgh University Physical Laboratory, into the thermal conductivity of iron, copper and German silver. The principal conclusion in the paper is that in iron thermal conductivity increases with increased temperature, and that, therefore, iron can no longer be looked upon as an exception to the rule followed by the other metals—viz., that their conductivity increases with temperature.

Discharged shoemakers in Weymouth, Mass., are unable to obtain employment in the neighboring towns, and at least two manufacturers are liable to be arrested on the charge of conspiracy to prevent their obtaining work.

Improved Hyatt Filter.

About a year ago we illustrated and described in detail two filter designs adopted by the Hyatt Pure Water Company, of Newark, N. J. Since then a number of changes and improvements have been made, the engraving on this page representing one of the new forms. This filter is of 10-foot diameter and is 13 feet high, though 30-foot filters are turned out for special requirements. Like the other filters built by the Hyatt Company, it is made of wrought iron and steel and is intended for water purification for all purposes. Its manner of working is practically the same as that of one of the filters which we have previously described.



IMPROVED HYATT FILTER, BUILT BY THE HYATT PURE WATER COMPANY, NEWARK, N. J.

In filtering, the inlet valves A and B and the outlet valve C are opened and all other valves are closed. The water will then flow to the filter through the main supply pipe W above the filtering material, which is composed of a mixture of sand and coke, percolate through it and escape through the cone valves K, which are filled with copper shot, preventing the filtering material from escaping, but allowing the water to flow freely to the outlet pipe X. When washing the filter, the valves A and C in the inlet and outlet pipes are closed and the valves L and Y opened. Then by means of the hand pump S enough water is forced through the header Z into the hydraulic cylinders E to cause sufficient pressure to open the valves on the top of the discharge pipes D, a safety valve, as shown, being adjusted to prevent the pressure increasing above that required. The valves on the discharge pipes are spring loaded, as will be understood from the engraving, the whole arrangement constituting one of the new features of the apparatus. Water passes from the inlet pipe W to the outlet pipe X; thence through the outlet system into the cone valves K, entering the filter at the bottom under the filtering material, up through which it passes, agitating and loosening it, and producing pressure which causes the material to be discharged up through the discharge pipes D into the upper compartment or tank, which should always be kept filled with water. The material being heavy settles immediately to the bottom, displacing the water, which flows out through the upper waste pipe at the right, carrying with it the silt. After the material has all been discharged into the tank the valves L and C are closed and the lower waste valve H is opened.

The center valves F also are opened by increasing the pressure in the hydraulic cylinders E by means of the hand pump S. The material then settles back into the lower compartment, displacing the water, which escapes through lower waste-pipe. After the material has all settled back into the lower compartment, the

seats of the center valves F are washed free from all sand, by means of the hose U. The water is then allowed to escape from the hydraulic cylinders E, by means of the three-way cocks, which are placed in the branches that connect each hydraulic cylinder E with the header Z. The springs on the discharge pipes will force the valves of the latter to their seats and hold them there against the working pressure. The valves H and Y are closed; the filter is then ready to recommence filtration. The first water from the filter, after washing, should be used to fill the upper compartment or tank, as it may not be perfectly bright. This may be done by opening the valve A in the main supply-pipe and the valve J in the pipe I extending from outlet-pipe to tank. After the tank has been filled the valve C in the outlet-pipe X is closed, and bright filtered water will be obtained.

If, in discharging the filtering materials from the lower to the upper compartments, any of the discharge pipes become clogged, a passage may be opened by shaking the wrought iron loosening rods, motion being communicated to these by means of the levers R, which project from the under side of the hydraulic cylinders E.

The coagulating apparatus T, which also is a new addition to this filter, is connected with the main supply pipe to the filter by means of two ¼-inch brass pipes, which are tapped into the supply pipe on either side of the gate valve B. The inlet pipe to the coagulating apparatus extends through the cover; the outlet pipe extends nearly to the bottom of the apparatus, thus insuring a good solution of the coagulating agent. In each pipe, between the supply pipe and the apparatus, globe valves N and M are placed. The object is to permit the coagulating apparatus to be removed, if necessary, without disturbing the main piping. The flow of the coagulant depends upon and is regulated by the difference of pressure at the points where the inlet and outlet pipes, to and from the apparatus, enter the main supply pipe. The difference of pressure is produced by partially closing the gate valve B. A difference of pressure of ½ to 1 pound, usually about ½ pound, will be sufficient. The globe valve N in the apparatus inlet pipe should always be kept wide open. All further regulation of the flow of the coagulant should be done by means of the globe valve M on the outlet pipe from the coagulating apparatus.

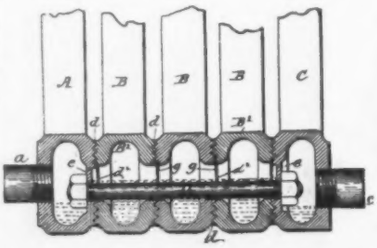
The coagulating solution of ammonia alum can readily be changed by draining off through the waste pipe P.

The 10-foot filter which we illustrate has a capacity of 250 gallons per minute, or 325,000 gallons per 24 hours, and contains 392 bushels of filtering material. We may remark here that Hyatt filters continue to meet with success, and a number of large plants have recently been erected. Among them is a plant for the water supply of Atlanta, Ga., embracing 12 of the filters which we have just described.

The following firms belong to the German wire-rod pool: Aachener Hütten-Aktien-Verein Rothe Erde, Aachen; Boecker & Co., Schalke; E. Boecking & Co., Mülheim am Rhein; Düsseldorfer Eisen-u. Draht-Industrie, Düsseldorf-Oberbilk; Düsseldorfer Röhren-und Eisenwalzwerke (vormals Poensgen), Düsseldorf-Oberbilk; Eisen-Industrie zu Menden und Schwerte, Aktien-Gesellschaft, Schwerte; Eschweiler Aktien-Gesellschaft für Drahtfabrikation, Eschweiler; Flender, Schlüder & Vollrath, Düsseldorf; Funcke & Elbers, Hagen i. W.; Funcke, Borbet & Co., Langendreer; Gutehoffnungs-Hütte, Aktenverein fur Bergbau und Hüttenbetrieb, Oberhausen; Hasper Eisen und Stahlwerk, Krieger & Co., Haspe; Eisen-und Stahlwerk Hoesch, jetzt Aktien-Gesellschaft, Dortmund; Phœnix, Aktien-Gesellschaft für Bergbau und Hüttenbetrieb, Laar b. Ruhrort; Aktien-Gesellschaft Steinhauser Draht-Industrie, Bommern i. W.; Friedrich Thomée, Werdohl; Les Petits Fils de Fcois. de Wendel & Co., Hayingen i. L.; Westfälischer Draht-Industrie-Verein Hamm i. W.; Westfälische Union, Aktien-Gesellschaft für Bergbau, Eisen und Draht-Industrie, Hamm i. W.; Witte & Kämper, Osnabrück.

A New Steam Radiator.

We present herewith illustrations of a cast-iron steam radiator recently patented by Ezra F. Landis, Lancaster, Pa., and which is put on the market by the Mt. Penn Stove Works, Reading, Pa. Fig. 1 is a longitudinal vertical section of the



A New Steam Radiator.—Fig. 1.—Longitudinal Section through Base.

lower portion of the radiator, showing its interior construction. The steam is admitted through the pipe *a* into the bottom of the end section A, and after ascending through one branch of the section descends through the other, and then passes into section B, ascending one branch of the same and descending the other, and thus freely circulating through all the sections, until it reaches the bottom of the end section C, from which it passes with the water of condensation into the return pipe *c*. Between each section, and integral with it, is a partition, as shown at *b*, Fig. 2, above the level of the bolt D, which permits the water of condensation to escape under and along the bolt. To prevent the steam from

Fig. 2.—Horizontal Section through Nipple.

passing through these openings from the bottom of one section to another, there is placed between the sections a pendent gate or steam seal, made of thin sheet metal, which is retained between the inner edges of the grooved surfaces *d*. An important feature of this radiator to which special attention is drawn is the method of securing steam-tight joints between the sections. The sections at the point of juncture are provided with a series of concentric V-shaped grooves, *d*, Fig. 1, and so arranged as to become interlocked when two sections are brought together in position to be united, thus presenting a large surface for red lead and asbestos washers or other substance used between them. The sections are united by a binding bolt, as shown at D, Fig. 1, $\frac{11}{16}$ inches in diameter. Then by being put under a hydraulic press, specially constructed by Mr. Landis for the purpose, any desired pressure can be applied up to the breaking point. While under this pressure a few sharp taps of the hammer on the joint edges will, it is said, unite them securely for long shipments and rough handling. The nuts holding this binding bolt in place are drawn up by a socket wrench through opening *e*, and are entirely inclosed within the sections they unite. To form a rest for the nut upon the bolt, the openings in the lower end of the end sections A and C, Fig. 1, has a partition, *e*, with openings above the level of the bolt, to permit the water of condensation to escape. When it is desired to have the radiator sections further apart a nipple, G, as shown in Fig. 2, is placed between the sections, in which the steam seal is formed by the pendent or peforated partition. These nipples can be made with their faces converging so as to form a rectangular or circular radiator of any desired size with the same sections.

Perforated Iron Masts.—It is curious that naval architects should have been so far at sea about perforated iron masts in ships. It appears that the English sailing ship Æthelstan had a cargo of coal on board, and, spontaneous combustion having taken place, all the efforts of the crew were unavailing to save her from destruction. But it surprised the master and chief mate greatly to see flames issuing from the heads of the fore and main masts when the conflagration was still confined below deck. The masts, being made of iron, were of course uninflammable and the fire could not, therefore, run up them as it sometimes does in the case of wooden spars. But the apparent mystery was easily explainable. The lower masts were not only hollow, but had a number of perforations below deck for ventilating purposes. Consequently, when the cargo took fire the heated air rushed up these tubes, causing almost as thorough a draft as the chimney of a furnace, and with the air went, no doubt, a considerable volume of ignited gas. Thus in the very endeavor to guard against spontaneous combustion by improving the ventilation of the hold our maritime architects have created a new peril. Now, however, that their attention has been drawn to the matter, their ingenuity will do doubt prove equal to the occasion.

Canadian Customs Decisions.—J. Johnson, Canadian Commissioner, as chairman of the Board of Customs, has published the following department decision for January:

Coppered iron or steel wire, 15 gauge or coarser, 30 per cent.
Copper sheets or planes, ⅛ inch thick, free.
Electric light apparatus—parts of, when imported separately and which cannot be used for any other purpose—*i. e.*, lamps, carbons, &c.—25 per cent.
Fire brick for building or repairing furnaces for gas works, free.
Patterns, of iron or brass, 30 per cent.
Steel dies for harness, 35 per cent.

The German correspondent of the London *Engineer*, speaking of the pools in the German iron and steel trades, remarks: "The tyranny of these conventions is remarkable, for not long ago I mentioned the case of the thin sheet works, and now the Rhenish-Westphalian crude iron convention has taken measures to force the dealers not to sell pig iron under convention figures; if they do, their punishment is to be that no iron will be sold to them. In this way it is hoped to destroy competition against the works with iron which they themselves have made. It is remarked that, without such a step had been taken, there would be no chance whatever of the convention succeeding. Was ever anything so weak exposed to public view? But we have not seen the end of these boasted conventions yet, and who can tell what is still in store?"

There is some talk of the building of a wire rod mill at East St. Louis.

The Use of Centrifugal Machines in the Iron and Steel Laboratory.

BY J. LUETSCHER, PITTSBURGH.

The search for quick and simple methods in iron and steel analyses has always been the object of chemists. Professor Eggertz has made the first step in this direction with great success by his colorimetric carbon determination, while Americans chemists have invented quick and accurate colorimetric manganese and gravimetric silicon determinations; but the rapid estimations of phosphorus and sulphur were still the problems yet to be solved.

A year ago Mr. George W. Goetz, of Cleveland, brought out a method for determining phosphorus in steel, described in German, English and American papers, which promises to prove an exceedingly valuable assistance in the basic open-hearth process. He dissolves the steel in nitric acid, evaporates as far and fast as possible in a large test tube, adds molybdic acid solution, and pours the solution containing the yellow precipitate into a tube, which is an improved shape of the Eggertz volumetric phosphorus tube; this is put into a centrifugal machine, and the separation of liquid and precipitate is accomplished in five minutes; the amount of precipitate can be read off at once. The results are quite accurate if certain precautions are taken. I have made a large number of comparative tests which agreed splendidly with carefully obtained gravimetric determinations. The less carbon and silicon in the steel the better the results. The nitric acid solution must be boiled down as far as possible; the addition of a drop or two of concentrated chromic acid after concentration insures complete precipitating, and so dispenses with evaporating to dryness. Like in the quick method of Mr. Wood, at Homestead, sharp shaking and rather high temperature of the mixture of steel and molybdate solution accelerate the separation of precipitate. The circle described by the graduated tube should be at least 3 feet and the number of revolutions be 400 per minute. A determination can be made in 20 minutes by a person not familiar with chemistry. In Europe several basic steel works have adopted the process, and they say it is a great help to them, especially as they are enabled by it to determine the phosphorus as a chemical precipitate, and not by mere guessing of fractures and bending tests, thus obtaining a more uniform quality of steel than hitherto.

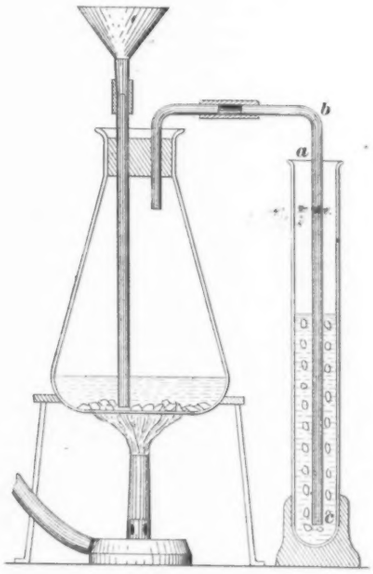


Fig. 1.

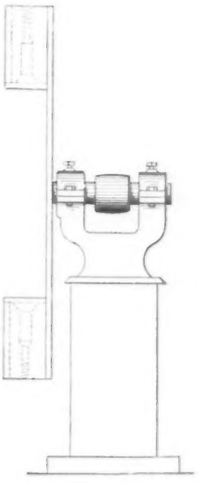


Fig. 3.

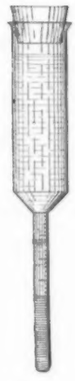


Fig. 2.

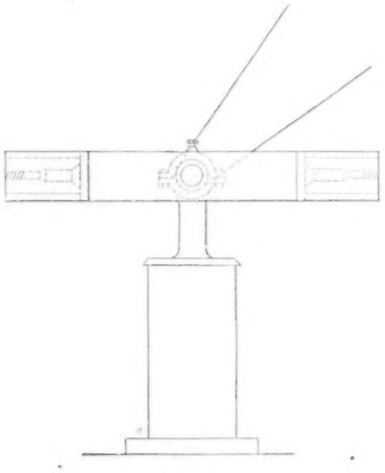


Fig. 4.

CENTRIFUGAL MACHINES IN THE IRON AND STEEL INDUSTRY.

Another application of the centrifugal machine is the one for rapid sulphur determination. While experimenting with Mr. Goetz's apparatus the company whose laboratory I had charge of had to deliver pig iron very low in sulphur—0.015 or less was the specification. This called for some very quick and simple process for determining the sulphur, and I concluded to experiment with the centrifugal machine for that purpose. Finally I obtained very good results by the following method: Two grams (for S. above 0.05 per cent. only 1 gr.) of drillings are dissolved in a small Erlenmeyer flask, Fig. 1, with funnel tube by hydrochloric acid (about 30 c.cm.), and the gas passed through 14 c.cm. of an alkaline solution of lead in a tube of about the size of a color carbon tube. After six to eight minutes the contents are gradually brought to boiling until all the black deposit of sulphide of lead at the end *c* of the inserted tube *a* is removed by action of hydrochloric acid, but so that not more white chloride of lead is formed than can readily dissolve again. After disconnecting, the tube with the lead solution is shaken up in order to suspend the sulphide of lead and rapidly emptied into a graduated tube, Fig. 2, which has exactly the same shape as the old Eggertz phosphorus tube, no improvement being necessary in this case. The tube is stoppered, put into the centrifugal machine for five or seven minutes, the precipitate will separate sharply from the clear lead solution and can be read off at once. The results are accurate $\pm$ 0.003 per cent. or S below 0.04 and $\pm$0.005 per cent. for higher percentages. The following precautions must be observed: The drillings should be fine, so as to permit quick complete dissolving; the tube *a*, Fig. 2, should be very narrow to compel the gas to form small bubbles. Heat must be applied very carefully and gradually until the tube *a* becomes hot at *b*, Fig. 1, which will be sufficient to remove all the black precipitate from *c* into the liquid. The alkaline lead solution must be perfectly clear, contain no flocks of alumina (from the caustic potash) and be strongly alkaline. The centrifugal machine should have a 3-foot diameter and make 400 to 500 revolutions per minute; too great speed will create such a centrifugal force that the glass tube might break. Not more drillings should be taken than are absolutely necessary, in order to prevent the formation of more precipitate than the graduation will hold. The probable amount of sulphur will mostly be approximately known by the appearance and grade of the pig iron or the quality of the steel. The lead solution is obtained by pouring a solution of acetate of lead (1 in 8) carefully into a solution of caustic potash (1 in 5) until the white precipitate ceases to dissolve by stirring, then a few sticks of caustic potash are added (about 50 gr. per liter solution) and the solution filtered. Lead solution proved to be the most suitable. Cadmium sulphide is too voluminous a precipitate and silver solution will not only be precipitated by sulphureted hydrogen but also by phosphureted hydrogen. Besides that, lead salts are cheaper than cadmium and silver salts.

A determination can be made in 20 to 25 minutes. I have been able to make eight in less than two hours, each one of them consisting of duplicates, of course with apparatus well arranged for the purpose. Duplicates should always be made, and the average taken as the true result, if they do not differ so much that another determination is necessary. Any boy can be instructed in a short time to make these determinations quite well. The method is quicker than the titration with iodine and hyposulphite of sodium, at least as accurate, if not more so; (0.003 can easily be detected and determined) for lower per-

centages, and can be worked by a boy at night, the tubes being permitted to stand any length of time for inspection by the chief chemist, while titrating, making standard solutions, &c., is a work that must be done by regular chemists and at daylight. Silicon, carbon and phosphorus do not interfere; only copper in larger quantities, but this error is common to all the "evolution" sulphur methods. It is quicker and far more accurate than Eggertz colorimetric silver-plate method and than the one, in which lawn-disks saturated with cadmium indicate the amount of sulphur by different shades of yellow. It needs a comparatively small amount of drillings.

The centrifugal apparatus I used, Figs. 3 and 4, consisted of a wooden disk fastened to an emery-grinder instead of the emery-wheel. A "Challenge" grinder No. 1, costing about $5, will suit the purpose quite well; the glass tubes are made by Emil Greiner, New York. A good centrifugal apparatus is described on pages 93 and the following, in the *Bulletin* No. 13, part I, United States Department of Agriculture, 1887, by Dr. H. W. Wiley, who uses it for separation of ether fat solution from milk in milk analyses, and who proposes its use in laboratories generally.

The quick sulphur determination will be chiefly appreciated by blast furnace managers, who often need a sulphur estimation very soon, as it gives in many cases as good an indication about the temperature as silicon; besides that, it will greatly assist in the decision about the quality for shipping purposes, where especially low sulphur iron is wanted.

NEW PUBLICATIONS.

MECHANICS OF MATERIALS. By Irving P. Church, C. E., Assistant Professor of Civil Engineering Cornell University. Published by John Wiley & Sons. Pp. 196-514. Price $3.00.

A book should be judged according to the place it is designed to fill. This is a text-book for students in engineering, and the numbering of the pages is a continuation of a work upon statics and dynamics by the same author. The greater portion of it treats of the resistance of materials and covers much of the ground ordinarily given under the heads of longitudinal, transverse, twisting and shearing stresses. The remainder consists chiefly of a presentation of the principles of graphical statics and the application of that science to many practical problems. The subjects are generally well presented. The construction of the cuts for illustrating the subject and the clear manner in which the descriptions are made bear unmistakable evidence of their use in the class-room before being put into their final form for publication; and they show that the author is a teacher who appreciates the difficulties of the student and is able to give him valuable assistance by way of statements, descriptions and forms. "Shearing Stresses In Flexure"—a difficult subject for the beginner—is developed from a comparatively elementary standpoint, and is thoroughly practical in its application. The general subject of shearing stresses, as a part of the more general theory of elasticity, is receiving more and more attention from writers and instructors. The treatment here given is probably as extensive as is desirable in an elementary work.

The "Graphical Statics" is a valuable part of the work, covering more than 100 pages. The advantages of this mode of analysis are apparent from the fact that it is very extensively used in the office of the practical engineer; and this fact compels engineering schools to include it in their courses of instruction. But compulsion is not needed, for it possesses an attractive field, inasmuch as many solutions are shorter by this method than by algebraic analysis; it presents its results directly to the eye, checks its own results more certainly than other methods check theirs, and, finally, enables one to solve certain problems with comparative ease, which by other methods require a formidable amount of analysis. The subject is here presented in an elementary manner, and includes the most modern methods of this science. Arches and arch-ribs are quite fully discussed.

Notwithstanding the excellent qualities of the work, it is not so perfect as to be above criticism. The parenthesis has its proper office in the hands of a writer, but in this work it is used so freely and excessively as to be a blemish. In many places it would be better to omit it and substitute commas, and in others an independent sentence would be preferable. In an elementary treatise it is advisable to develop the more elementary principles first, and it will be admitted that these are involved in a simple pull. Let this principle be somewhat fully developed before introducing another — on the general principle one thing at a time. In this work "Shearing Stresses" are involved in tensile stresses at the outset, and although shear accompanies tension we do not find that the former is involved in the development of the principles of the latter. By this arrangement the treatment of shearing is separated by other matter unnecessarily. For a text-book more unsolved examples are desirable. The apology in the preface for conceding certain topics to the mathematical student seems unnecessary, since they are no more analytical than some other articles which the author has included in the development of the subject. In some cases a subordinate principle is referred to when a general one is more desirable, as on page 256, where it states that "remembering that here $d^2y \div dx^2$ is negative," and on page 257, "$EI\frac{d^2y}{dx^2}$ is written equal to a negative quantity because itself is essentially negative; for the curve is concave to the axis of X in the first quadrant of the co-ordinate axes." In such cases it is as easy and more satisfactory to state the general principle, proved in the calculus, that when a curve is concave to the axis of X the ordinate and second derivative have contrary signs, and when convex they have like signs. A similar opportunity presented itself near the foot of page 254, of stating a general principle for the "equation does not admit of negative values of x," since the function is discontinuous at the origin. On page 269 the expression "detached loads" is used in an exceptional sense, and is a poor substitute for "concentrated loads," the latter having become common in the nomenclature of this science. On page 266 the analysis ought to involve the proper signs so that the conclusion in the next page would simply be an interpretation of the result. Thus, if the shear on the right half of the beam, when supported at its ends and loaded with a weight P at the middle, be $+\frac{1}{2}P$, then for a section in the left half we would have

$$J = \tfrac{1}{2}P - P = -\tfrac{1}{2}P,$$

thus showing from the equations that the shears have opposite signs in the respective halves of the beam. The elaborate discussion of the subject of long columns by the American Society of Civil Engineers is valuable, but is not referred to. In graphical statistics a few more examples of line structures of roofs and bridges, involving forms more or less common in practice, would be acceptable to the student.

The work as a whole is too meritorious to be seriously affected by these criticisms. No author so covers the ground over which he works in regard to quantity and quality of matter as perfectly to satisfy the notions of others. This difference of views, modified by the circumstances surrounding the instructor, has resulted in the production of considerable literature, and we notice that the firm mentioned in our heading publish works upon this subject from at least six different authors, all of whom have been (and all but one now are) professors in technical schools. D. W.

THE VOSBURG TUNNEL. By Leo Von Rosenberg. 35 Broadway, New York. Price, 1.00.

Mr. Rosenberg, who was connected with the Lehigh Valley Railroad during the construction of the Vosburg Tunnel, has printed a handsomely equipped monograph of the construction of that engineering enterprise, which was built to save a distance of about 4 miles near Vosburg, on a bend of the north branch of the Susquehanna River. Mr. Rosenberg describes in detail the method of tunneling, showing by elaborate drawings the position of the bore holes, the method of firing, the monthly progress, the system of lumbering adopted, and the final arching. The work is a model of its kind, containing, as it does, all the main data in which engineers are interested, a special feature being the illustrations from drawings made, we understand, by Mr. Rosenberg himself, who has had very extensive experience in this class of work.

NOTES ON ASSAYING OF LEAD, SILVER AND GOLD. By Frederick W. Clark, Assistant Professor of Mining and Metallurgy, Massachusetts Institute of Technology, Boston, Mass.

For the use of the students of the Boston Institute of Technology, Professor Clark has printed a pamplet of 40 pages, giving the results of more recent experience in assaying silver, lead and gold. The first chapter deals with methods of sampling, appliances and reagents, while the second takes up lead. It is particularly useful, as it embodies the practice of a number of American assayers instead of following the older methods adopted by Kerl, Mitchell and others.

WATER WORKS DIAGRAMS. Size 16 x 12 inches. Published by the *Engineering and Building Record*.

We have received from the New England Water Works Association a collection of diagrams representing the general plans of 26 different water works, contributed by members of the association and compiled by a committee. The diagrams, while not engraved in a very finished manner, are of considerable interest and value, showing the location of the sources of supply and storage reservoirs and giving all the main facts and figures connected with them, explanatory notes being given on each sheet.

Senator Hale lately introduced a bill prepared by the American Forestry Congress to preserve the forests, which is outlined as follows: "It withdraws from entry as forest lands all public lands of the United States more valuable for their timber than for agricultural purposes. It institutes the office of Commissioner of Forests, and authorizes the appointment of four assistant commissioners. The commissioner is instructed to form the forest land into what are designated as forest reserves. He is given power to frame rules and regulations for the government of these reserves, and to appoint rangers to see that the rules are observed. No forest lands are to be sold, but the stumpage on them may be disposed of in the discretion of the Commissioner of Forests."

The American Iron and Steel Association, Philadelphia, have issued a very handy "Statistical Abstract," being a collection of statistics relating to the iron and steel industries of the United States. It is practically a republication of the tables printed in the annual reports.

The Barb-Wire Manufacturers of the United States.

Consumption, 130,000 to 150,000 tons. Productive Capacity, 300,000 tons.

The barb-wire trade of the United States has been deeply roused by the announcement of the decision of Judge Shiras, which is now known to have considerably greater significance than was at first believed. After a long struggle with "moonshiners" Washburn & Moen and I. L. Ellwood had apparently succeeded in obtaining full control, and there were comparatively few concerns which did not prefer to pay the moderate royalty, 15 cents per 100 pounds, to continuing a contest against the patents. A part of the daily press throughout the country, and notably in the West, has persistently aimed to create the impression with the public that the barb-wire trade was controlled by a grand monopoly, extorting from the consumers enormous profits. As a matter of fact, the business in the West has been characterized by the keenest competition, reducing prices to figures at which only the best equipped and best located have been able to live, while a number of works have failed or have voluntarily closed down. Although these facts are only too well known to a narrower circle, a considerable constituency in the trade, and probably the public at large, have been led to believe that the only obstacle to a very remunerative business was the fact that the owners of the patent secured the lion's share of the profits. It is readily argued that, therefore, when once the payment of royalties can be safely abandoned, the manufacture of barb-wire offers an opportunity for highly profitable investment of capital.

No more serious mistake could be made, since the business is now greatly overdone. It is the duty of those well informed to prevent a waste of capital which would grow out of any efforts to extend capacity, even if the fact were not considered that every accession to the ranks of producers places additional burdens upon older manufacturers, in spite of their advantages growing out of a long connection with the business. Again and again efforts have been made to formulate some plan by which the present fierce competition could be abated and by which a moderate manufacturing profit could be secured. They have failed wretchedly, and at the present time there seems little prospect of the adoption of any project likely to moderate the struggle which is raging. We are inclined to the belief that much of the disaster and loss which have characterized the barb-wire business for years might have been avoided had publicity been given to the facts bearing upon the industry.

Recognizing that a few figures would go far toward dispelling erroneous impressions, and that the present time is particularly opportune, *The Iron Age* has endeavored to arrive at some authentic data. We have met with considerable indifference and some direct opposition, and can therefore give only estimates, which, however, are accurate enough to furnish a correct appreciation of the general situation. Those who control the patents have from time to time issued licenses to manufacturers. In some cases these have been given in part consideration or as full payment for the transfer of patents, and in a few instances have not been taken advantage of in full by those to whom they were granted. In the aggregate the tonnage licensed is stated by good authority to be 200,000 net tons. In no year has the product exceeded 180,000 tons, and has lately fluctuated between 130,000 and 150,000 tons. It is a mooted question whether or not the demand for barb wire is increasing. Some argue that its popularity has diminished, that the fencing of large tracts in the West has been completed, and that now only moderate mileage of new fencing is going on, and that repairs have become the principal source of demand. Others insist that the consumption shows no signs of relaxing and bring up evidence of sales in new territory to prove their position. The trade will be content to deal with the present, which clearly shows, from the course of prices, that production is overabundant even when due consideration is given to the decline of the raw material, wire rods, as compared with prices paid in past years.

We have followed the general plan that a clear statement of the number of machines in the United States, with some data on their capacity, would best serve to furnish proof of the fact that even now the manufacturing plant is in excess of current requirements.

We give below a list of the manufacturers, appending the number of machines which they possess; enumerating first those from whom we have direct official data.

List of Barb Wire Manufacturers.

	Machines.
M. J. Adam, Joliet	10
American Barb Wire Company, St. Louis	90
Ashley Wire Company, Joliet*	30
Ayers & Decker Mfg. Company, Keokuk, Iowa	10
Baker Wire Company, Des Moines, Iowa.	64
California Wire Works, San Francisco*	20
Cambria Iron Company, Johnstown, Pa*.	62
Consolidated Barb Wire Company, Lawrence, Kan	25
Crandal Mfg. Company, Chicago, Ill	15
Freeman Wire Company, St. Louis	30
Frentress Barb Wire Fence Company, East Dubuque, Ill	8
Jacob Haish & Co., De Kalb, Ill	97
Iowa Barb Wire Company, Allentown, Pa*	66
Iowa Barb Steel Wire Company, Marshalltown, Iowa	80
Indiana Wire Fence Company, Crawfordsville, Ind	15
Joliet Enterprise Company, Joliet (building 10)*	40
Lambert & Bishop Wire Fence Company, Joliet	65
Lockport Wire Fence Company, Lockport, Ill	12
Merchants' Union Barbed Wire Company, Des Moines, Iowa	18
Northwestern Barb Wire Company, Sterling, Ill	35
Omaha Barb Wire Company, Omaha, Neb	21
Sandwich Enterprise Company, Sandwich, Ill	3
H. B. Scutt & Co., Joliet*	30
H. B. Scutt & Co., Limited, Pittsburgh	163
Shreffler & Van Fleet, Joliet	30
Superior Barbed Wire Company, DeKalb, Ill	30
Union Iron Works Company, Chattanooga, Tenn	5
W. Watkins, Joliet	20
Zeller, Phelps & Swift, Rock Falls, Ill	4
Washburn & Moen Mfg. Company, Worcester, estimated*	250
J. A. Roebling's Sons Company, Trenton, N. J. (outside of Buckthorn)*	10
P. P. Hill, Rock Falls, Ill	10
Janesville Barb Wire Company, Janesville, Wis	12
Hawkeye Steel Barb Fence Company, Burlington, Iowa	40
Lockstitch Fence Company, Joliet	25
Stiles & Calkins, Chicago	100
Dillman & Knowlton Mfg. Company, Joliet	25
Illinois Barb Fence Company, Joliet	25
Joliet Barb Wire Company, Joliet	20
I. L. Ellwood & Co., De Kalb, Ill	250
Kansas City Barb Wire Co., Kansas City, Mo	35
St Louis Wire Mill Company, St. Louis	30
Ohio manufacturers	70
Total	2,190

The reports as to the capacity of the machines vary within wide limits, as is natural considering the fact that many of them are of old design, slow running, and that there is considerable difference, too, whether they make two or four point barb wire. Some report only 1000 pounds per machine per ten-hour shift, others 1400 pounds, a good many 2000 pounds, and in isolated cases as high as 3000 pounds. We have computed the average of about 1000 machines reported and make it close to three-fourths net ton per day per machine. Some of our correspondents who are leading manufacturers incline to the belief that probably 1300 pounds is a fair average, but we adopt the above figure as probably most closely reflecting the present capacity, in view of the improvements in machinery during the past few years.

One very important consideration bearing upon the proper relation between the productive capacity and the consumption is that growing out of fluctuations of the latter. Only very few concerns run up to full capacity except for a part of the year; at other times they are wholly or partly idle. On the other hand, it is true that in seasons of active demand and good prices the output can be pushed by running overtime. Under the circumstances an estimate of 200 days annually, full time, will certainly seem a very moderate estimate to allow for capacity. This could represent a possible output of 150 net tons per machine per annum, or, taking the number of active machines at 2000, we would reach a total capacity of 300,000 net tons. This, it will be noted, is a moderate estimate.

The significance of this figure will be readily appreciated. It means that the live concerns in the country enumerated, with two exceptions, licensed under the Washburn & Moen and Ellwood patents are capable of turning out annually at least double the quantity of barb wire which the normal demand calls for. Is it reasonable to suppose that the reduction of the royalty to a nominal figure, or possibly later its entire abandonment, will hold out to the trade any advantages through low prices which have not already been secured by the sharpest competition? Can any cautious capitalist see in a business in which productive capacity and consumption are so poorly balanced opportunities for profitable investment? It may be urged that a good deal of the machinery is antiquated, and that its abandonment with or without a contest is merely a question of time. The temptation may be held out that new inventions, better facilities for obtaining raw material or reaching the principal markets offer chances to make a profit at prices at which the older concerns cannot live. It may be stated that the actual cost of manufacturing above the cost of raw material is comparatively small, and that even if the arguments thus put forward had some foundation in fact, they certainly do not apply to more than a small proportion of the capacity enumerated

* Draw their own wire.

Serious defects in the construction of the Lick observatory will delay the time for fully demonstrating the power of the great telescope. The most serious is the mounting of the telescope on a hollow iron pier 30 feet high, which extra elevation, it is claimed, was not needed on top of a mountain 4000 feet above the level of the sea. Owing to its marvelous magnifying power the telescope is so sensitive that the placing of a man's hand on the hollow iron pier is sufficient to throw the star entirely out of the field. This can only be obviated by the removal of the present pier and the building of a solid one of brick or stone, or else placing the base of the instrument directly upon the summit of the mountain. Another serious fault is the removable floor for the great dome. Experience has demonstrated that instead of five it requires fifty minutes to effect the desired change of position of the floor, by which time the object of observation would, necessarily, be in a different place in the heavens.

THE WEEK.

The alleged encroachments of English colonists upon the territory of Venezuela, with the object of establishing their claims to rich Yuruari gold mines, is a source of increasing friction between the two governments, and the Venezuelan Consul in New York declares that the movement is not a boundary question, but a forcible acquisition of territory—shameless robbery—and that the United States should intervene. On the other hand, it is affirmed that English settlers have invested $10,000,000 in the gold-mining property and are entitled to protection.

The official statement of the output of anthracite coal for January gives a total of 2,255,692 tons, against 2,243,312 tons in 1887, 2,338,271 in 1886, 1,641,803 in 1885 and 1,899,572 in 1884. This production is the largest in the month of January in the history of the trade, except that in 1886, and it may be a surprise that with the Schuylkill and Lehigh regions idle such a result was possible. It indicates that the maximum capacity of the mines is much larger than is admitted. During the year 1887 the total production of anthracite coal was 34,641,017 tons, of which 10,609,028 tons were produced in the Schuylkill region, 4,347,060 in the Lehigh region and 19,684,929 in the Wyoming region. The percentage of production was: Wyoming region, 56.82 per cent.; Schuylkill region, 30.63 per cent.; Lehigh region, 12.55 per cent. These figures indicate that the miners in the Wyoming region are capable of producing at least 33 per cent. advance on the production of a year ago, and if all the regions should be worked to this capacity the yearly production of anthracite would be about 45,000,000 tons.

A fire in Providence, R. I., last week consumed the Aldrich House, the Billings Building, devoted to general hardware and manufacturing purposes, and much other valuable property. The total loss is about $350,000.

Mr. Mutsu Munemitsu has been appointed Japanese Minister to the United States, in place of Mr. Jusanmi Rinichi Kuki, who has been transferred to Japan as chief of the Imperial archives; and the German Government has appointed Count Arco Valley as Minister to the United States to succeed Mr. von Alvensleben.

A serious difficulty is reported by Consul General Lewis at Morocco, who has telegraphed for two American ships of war to demand the release of a naturalized American citizen arrested on account of his occupation of mosque property for trading purposes. The Sultan not only refused to liberate the prisoner, but the Pasha was ordered no longer to recognize the treaty rights applicable to protected traders.

The baleful effects of trusts, not merely in raising prices, but in their inevitable tendency to lower the quality of the article produced in the absence of competition, are facts generally recognized. One of our commercial contemporaries makes the point that "another deadly foe of competition and of individual excellence is the trade union. No trust operates more directly to lower the quality of work and its products. The trade union places poor workmen on the level of good workmen. There are no degrees of good, better and best among the members, except as they are more or less docile and obedient to the mandates of the leaders, and punctual in the payment of their dues and of assessments to support strikes. The mechanic who is in good and regular standing at the lodge or encampment need not study to please the employer whose wages he fixes and takes. He has nothing to gain by punctuality, industry or skill in the performance of his daily tasks. He may come late and go away early. He may get drunk. He may botch his work as much as he likes. And all this with entire impunity, so long as the trade union to which he belongs is enabled to enforce its system at the expense of employers, for the man cannot be discharged, nor can another be hired in his place. It operates then just like a trust, to elevate wages artificially, and, with just as much certainty, to debase the quality of service rendered. The complaint is universal and true that merchants in all branches of business affected by trade unions are far less skillful and faithful than the same classes were in the old days."

The New York Legislature adjourned on Friday to wait until the Assembly ceiling is propped up and law making can be resumed with safety. Four holes have been cut through the Assembly floor and the library room below, and excavations will be made down to the foundations of the Capitol. When this is completed wooden pillars will be built up to to the Assembly ceiling.

A. C. Hobbs, of Bridgeport, Conn., who in 1851 gained a wide notoriety from successfully picking the Chubbs' "detector" lock, in England, also the patent lock of Joseph Bramah, thereby gaining a 200 guinea prize, was last week given an honorary banquet. John Farrel, representative of a large firm in this city, remarking upon the circumstance, said the lock Mr. Hobbs picked was a key lock, now completely discarded in this country, having been supplanted by combination locks, made with dials outside, with shafts which connect the dials with the works inside. These shafts are built in the doors in such a manner that no power can drive them in or pull them out. They are part of the door and cannot be removed or drilled out. Wright D. Pownall, secretary of a large New York safe company, said: "The key lock, such as that Mr. Hobbs picked, is entirely out of use here now. Why, nowadays it would bother one of our ordinary locksmiths much. It was the best in its day, but it has become obsolete. The 'combination' lock is the only thing used in America now. The art of safe making has been entirely revolutionized in the United States within the last 15 years."

San Francisco pleads in behalf of the ocean mail route between that port and the Australasian colonies of Great Britain, which, it is said, will be discontinued after November next when the present contract expires. The steamers carry 120,000 sacks of mail matter every year. The average weight of the sacks is, British, 48½ pounds per bag; American, 51 pounds per bag, making a total of 46,605 pounds of mail matter carried by each steamer on her round trip, or 606,000 pounds in a year. The colonies have almost exclusively maintained the line, although more than half the mail matter is American and the trade of the Pacific Coast is dependent on it very largely for its prosperity.

The grain crops in the Argentine Republic are reported to be the largest on record, fully compensating for the deficiency in wool. The railways are doing a brisk business, and all immigrants readily find employment.

Premier Greenway, of Manitoba, says the building of the Red River Valley Railroad has been guaranteed by responsible contractors. His Government scored a triumph in the recent election.

The Interstate Commerce Commission rendered a decision upon the complaint of the Boston Chamber of Commerce of discriminations made against Boston and in favor of New York upon grain shipments from the West. The commission decides that in view of the great volume of business to New York, the competition of railroads and canal, the extraordinary geographical and commercial advantages of New York, her unrivaled harbor and superior ocean service, the discrimination is both natural and reasonable, and that Boston cannot justly complain. The complaint is dismissed.

A letter written by General Grant is published which shows that he received from M. de Lesseps an offer of the New York presidency of the Panama Canal Company, with a salary of $25,000 per annum, but he believed subscribers would "lose all they put in," and he was not willing to connect his name with "a failure."

A boycotter in Chicago was arrested and held on $1000 bail, the first arrest under the new law, which provides for this offense a fine not to exceed $2000 or five years' imprisonment, or both.

A proposition to abolish the labor bureau at Castle Garden after March 1 is vehemently opposed by the Irish and German Emigration societies, who secured employment for nearly 17,000 persons landed there during the past year. The bureau is maintained at the cost of the societies.

The origin of cotton fires has been investigated by the National Board of Fire and Marine Underwriters, and they have decided that they are due to defective packing by cotton planters. Portions of the fiber are left exposed. Cotton not packed according to the rules of the Cotton Exchange will not be insured.

The preponderance of Americans in the Cuban trade is shown by the fact that of 108 vessels entered at Havana during January last 63 were American.

The newly organized American Live Stock Express Company, of Chicago, promise to revolutionize the cattle transportation business by leasing fast-freight lines from that city to New York and running their own cars of an approved pattern, the railways guaranteeing quick transfer. The route will be via the Grand Trunk and Delaware, Lackawanna and Western railroads

The Fisheries Commissioners, at Washington, have completed their labors, and signed a treaty which, it is believed, will result in a satisfactory settlement of the disputes that have existed for almost a century between this Government and Great Britain over the North Atlantic fisheries. The treaty is signed by all six of the commissioners. Before it can take effect it must have the ratification of the Queen of Great Britain, the Dominion of Canada and the Province of Newfoundland, as well as of the Senate of the United States. From a trustworthy source it is learned that to the United States fishermen are secured all the commercial privileges for which they have been contending, with the exception of the right to purchase bait in Canadian waters, which is expressly withheld. In Canada the intelligence excited much dissatisfaction, the feeling being that the granting of the right to American vessels to touch and trade in Canadian ports is a great victory for the Americans, as it virtually recognizes the justice of what the United States has been claiming all along. A lively time is predicted when the treaty is laid before the Dominion Parliament, which assembles in a few days.

The report of a committee of the New York Produce Exchange on freight discrimination charges that by arrangement made with the transatlantic steamship companies through bills of lading from Western cities to London, Liverpool and Glasgow are given at cheaper rates than are given on the same goods from the Western cities to this and other Eastern

seaports. No new contracts of that kind have been made between October 15 and December 1, but contracts were made before October 15, and since the expiration of the latter, it is charged, cutting has been carried on openly. By this discrimination millions of dollars invested in warehouses and elevators in New York, Boston, Philadelphia and Baltimore have been rendered unremunerative and longshoremen and other laborers have been kept unemployed more than half their time, while Produce Exchange memberships, which were once worth $5000 each, are going begging at $1600. The committee insists that the action complained of is an open violation of the Interstate Commerce law, and recommends that the commission be appealed to for redress, and that, should its decision be adverse to the Exchange, it should seek to have the law amended so as to cover the case.

Action is to be commenced to annul the charter of the New York and Massachusetts Railroad Company, whose road extends from Poughkeepsie to Boston Corners, a distance of 40 miles, and is projected to Chicopee, Mass. The road is to be operated in connection with the Poughkeepsie Bridge.

Large purchases of Southern pine lands have recently been made by parties in Chicago.

President Corbin has sent a personal donation of $20,000 to be distributed among the most necessitous of the Reading miners for the relief of their families until such time as they will again be able to support themselves by their own resources. Not a few will be ready to affirm that this is the best investment Mr. Corbin ever made.

The Saturday half-holiday, was an experiment which has proved to be a failure. The promised advantages have not been realized, either by the manufacturer, workman or trader. The commercial exchanges one and all have pronounced against it as being detrimental to business interests. The manufacturer finds that it discriminates against New York to the advantage of rivals elsewhere, who have the benefit of the day's labor. Workmen have learned that reducing the hours of labor ultimately brings about a corresponding reduction in wages. Besides, idleness proves to be demoralizing, bringing with it many temptations to profuse expenditure. It might be difficult to tell what is the most serious, the injury inflicted upon manufacturers by holiday interruptions, the lack of uniformity among tradesmen in closing their places of business, or the complications and embarrassments in financial circles arising from a disturbance of the ordinary routine in regard to banking transactions.

How to produce skilled mechanics is the subject of special inquiry by President G. W. Atherton, of the Pennsylvania State Agricultural Commission, recently appointed by the Governor, and who is about leaving for Europe in pursuit of information. Of his plans and purposes he says: "The object of the commission is to create public sentiment. Our work is divided under three heads—the need of manual training in the public schools; how this need has been supplied in other countries, and how far it would be feasible to go in combining in the public schools intellectual and industrial education, without the latter interfering with the former. The system has been introduced in the schools in Chicago, St. Louis, Philadelphia, New York and Boston. In England and on the Continent the plan has been in operation for a number of years. The result shows that the boys who have been trained in this way become more proficient than apprentices who have worked at a trade during the same length of time. The object is not to teach trades, but to educate the hand and eye in those mechanical processes that prepare the boy to become a better mechanic when he undertakes to learn a particular branch in any of the great industries of the world. When we meet again next fall to compare notes and the results of our information, we propose to present to the Legislators a well-digested plan to guide them in framing a proper bill."

The establishment of a university for artist artisans is proposed, so that a piece of brass shall not be looked upon altogether from a mercenary point of view, but be converted into an article of beauty, and the United States be enabled to vie with France in the development of artistic skill in the treatment of metals.

An Odessa dispatch to the London papers says a naphtha reservoir, to cost 2,500,000 rubles, is to be built in that city. It will have a protecting sea wall 1200 yards in extent. Into this reservoir the oil will be pumped direct from the tank holds of the specially-constructed petroleum vessels running between Odessa and Batoum.

The Brooklyn warehouse combination have signed an agreement raising the wharfage charges for vessels. Of late years free wharfage has been the rule rather than the exception.

The following statistics give the value of the productions of California in 1886 and 1887:

	1886.	1887.
Wheat	$30,000,000	$30,000,000
Barley	20,000,000	10,000,000
Other cereals, &c	7,500,000	8,000,000
Gold and silver	19,000,000	19,000,000
Base bullion and lead	1,000,000	1,250,000
Other base metals	1,350,000	1,500,000
Wine and brandy	7,500,000	7,000,000
Wool	8,000,000	8,000,000
Lumber	7,100,000	10,000,000
Quicksilver	1,100,000	1,300,000
Fruit	9,000,000	14,000,000
Raisins	1,750,000	1,000,000
Cattle, &c., slaught'd.	27,000,000	29,000,000
Dairy produce	8,500,000	9,000,000
Coal	500,000	300,000
Increased value given to manufacturers by labor	40,000,000	43,000,000
Total	$181,300,000	$192,850,000

The trade of San Francisco for 1887 may be summed up as follows:

Imports foreign countries	$42,000,000
Imports by rail	22,000,000
Exports by sea	35,000,000
Exports by rail	30,000,000
Manufactures distributed on the coast	80,000,000
Total	$209,000,000

The import trade has increased about $4,000,000 in value, while the exports by sea declined, owing to the falling off in the wheat crop and the interruption caused by the operations of the famous syndicate of 1887.

The Presidential proclamation exempting German vessels from discriminating tonnage taxes in consideration of a reciprocal exemption of American vessels in German ports has prompted several other governments to apply for similar advantages to affect their own shipping. Italy represents that American vessels have been relieved of all burdens in Italian ports and she is entitled to reciprocal privileges. France is said to contemplate a similar application and England has the subject under consideration. As American tonnage in foreign ports is comparatively small, the reciprocity referred to appears to be of a one-sided character.

The Reading miners' strike has come to an end through the persistency of Mr. Corbin in refusing a settlement except on the condition that the men should first return to their work, which they abandoned January 1, rather than accept the $2.50 basis which the company offered. The number of men and boys who went out was about 20,000, and their wages on the proposed basis would have averaged not far from $10 per week. As they have been idle 42 days, or seven weeks, the aggregate loss in wages is $1,400,000, an amount irrevocably lost in obedience to the commands of their leaders. Supposing that an equal number of men have been idle in the Lehigh region during the 22 weeks that have elapsed since the strike, at least $4,000,000 in addition have been lost to the miners. According to one computation the railroad men have lost $240,000, and the iron-makers who were thrown out of employment $700,000 more. The aggregate therefore may be tabulated as follows:

Lehigh miners	$4,000,000
Schuylkill miners	1,400,000
Railroad men	340,000
Iron-makers	280,000
Total	$6,020,000

The Reading Company probably consider their victory cheap at any cost.

John H. Autcliff, of the firm of Stewart, Autcliff & Co., iron and metal dealers, in Boston, has been missing since Monday, February 6. He left home ostensibly on a business errand, and since that time no trace of his whereabouts has been discovered. Mr. Autcliff was 60 years old.

The Secretary of the Navy has decided to contract with the Herreschoff Company, of Rhode Island, for the construction of a first-class torpedo boat, to cost $32,750. The proposition of the Vulcan Iron Works, of Chicago, to build a similar vessel at a cost of $64,800 has been declined.

Carving machines, each of them capable of doing the work of eight to ten men, have been introduced into the Pullman car shops, in Illinois, as a consequence of the recent strike, and, as claimed, with success. The machines work from a pattern, previously made by hand, which is placed in the center. A "needle" is made to follow all the curves, &c., of the pattern and chisels on the end of arms at each side make duplicates of the pattern. These machines, the superintendent says, will largely supersede hand work, and at the same time insure uniformity.

In reporting favorably Representative Cox's bill appropriating $1,500,000 for the purchase of a site and erection of an appraisers' warehouse in New York City the House Committee on Public Buildings say that the present warehouse, while conveniently located, is a leased building, poorly adapted for the appraisement of imported goods, and the rental is equal to 8 per cent. on an appraised valuation of the property at $810,000. The custom-house building, over a mile distant, should be located near the appraisers' warehouse.

The town of Mt. Vernon, Ill., 60 miles from St. Louis, was devastated by a cyclone last Sunday. Thirty-five persons perished, and buildings valued at $500,000 were torn to pieces, the *débris* in several instances burning up.

The European war cloud again thickens. Prince Bismarck has obtained from Count Schouvaloff, the Russian Ambassador at Berlin, a definite declaration of the Czar's demands with reference to Bulgaria. The Czar asks a substantial recognition of the right of Russia to control Bulgaria and Roumelia. Prince Ferdinand and the Sobranje are to be wiped out and a Russian Commissioner, with a Turkish colleague, is to reorganize the Government and the army and control the elections for a new Sobranje. The impossible nature of these demands aggravates the situation. The Paris *Temps* says that extreme activity prevails at all of the French arsenals, and that a fighting fleet is being fitted for active service. The acceleration of the Italian naval preparations is due to urgent representations from Berlin.

The Iron Age

New York, Thursday, February 23, 1888.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
JAMES C. BAYLES AND
CHAS. KIRCHHOFF, JR., - EDITORS.
GEO. W. COPE, - - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - - HARDWARE EDITOR.
JOHN S. KING, - - - - BUSINESS MANAGER.

One of the great Gogebic mine consolidations, announced with such a flourish of trumpets last year, expired officially on the 15th inst., although it was practically deceased months before. On that day 11 deeds were placed on file at Ashland, Wis., conveying from the Lake Superior Consolidated Iron Company to the original owners the mines which were to have formed the consolidation. They were known as the Moore-Benjamin group. The Burton mines, known as the Bessemer Consolidated, are still under the control of the capitalists represented by ex-Senator Windom. The stockholders in these mines held a meeting at Milwaukee on the 15th inst., and decided to issue bonds to cover the amount due to John E. Burton for money advanced, and also to raise the funds needed to prosecute mining operations until the enterprise became self-sustaining. An extension of time was given Mr. Windom and his associates in which to make the necessary arrangements for taking possession of the property. The ease of the money market may contribute materially to the success of this project, but it is understood that some of the prominent Western iron manufacturers who were interested in it at its inception have withdrawn from the syndicate.

The people of Chicago and vicinity have for a long time been subjected to alternations of hope and disbelief over the prospect of a supply of natural gas. The discovery of low-pressure gas in numerous artesian wells within the city limits seemed for a time a very promising indication that gas existed beneath the city in sufficient quantity if the reservoir could be tapped. But weeks have come and gone since then, and the city is apparently no nearer a flow of gas from that source than when the first discovery of low-pressure gas was made. On January 31 a heavy flow of gas was struck at Francesville, Ind., only 70 miles distant, and the announcement was at once made that the owners of the well were forming a company to pipe the gas to Chicago. As this was the nearest well of any consequence that had thus far been found, the scheme seemed to be probable, and the Chicago press devoted some attention to its details as outlined by those interested it it. But the Francesville well, after roaring a few days like a genuine natural-gas wonder, gradually weakened, and as it weakened the hopes of its owners declined also. They will drill it deeper in the expectation of securing a permanent supply, but it will be hard to awaken confidence in a future development in that direction. The gas-trust magnates of Chicago talk of piping natural gas to the city from the Indiana gas wells, even if it is necessary to go 200 miles to insure a permanent supply, but the costliness of such a scheme and the doubtful success of piping natural gas long distances would seem to weigh heavily against its probability. Meanwhile the inventors of cheap fuel-gas processes are not idle, and, although they have done nothing tangible as yet, several systems are being pushed to the notice of the manufacturers and the city authorities with a flattering prospect of their early trial.

The Coal Strike.

Since the publication in the last issue of *The Iron Age* of a series of letters from a number of founders and of manufacturers who melt iron, we have been favored with a large number of communications bearing on the same subject. The fact that virtually the struggle is over makes it unnecessary to place them before our readers, especially since in a general way their tenor is such that the resumption will little influence the business of the writers. Still, our correspondence brings out some points which it is interesting to refer to.

We have letters from 21 stove founders, among them some of the largest in the country. Those in the Troy and Albany district concur in stating that the strike has had little influence upon their business, except that in some cases it has increased the cost of fuel. Some had gone over to coke partly or wholly, for melting. Among the New England stove manufacturers one notes inferiority of Pennsylvania iron, as compared with its usual character, and justly attributes it to poor coal. Another notes the fact that his fuel consumption is increased through the use of half coke and half Wilkesbarre coal in the place of all Lehigh anthracite. From different points in Eastern Pennsylvania and New York the reports agree substantially that the suspension of mining in the Reading and Lehigh districts caused but little inconvenience and loss. Six of the largest manufacturers of machinery in Philadelphia agree substantially in reporting little influence upon their business except a varying increase in the cost of fuel, or through the necessity of supplying fuel requirements from other than the usual sources. One of the largest significantly states that they were led to bituminous coal through an earlier strike in the anthracite region, and that they have continued to use it since for steaming purposes, while they have largely substituted coke for anthracite for melting iron. Similar reports come from large machinists at Wilmington, from different points along the Hudson River, this city, Northern and Central New York, and different points in New England. A founder in New York makes the important statement that, after having been forced to use the softer anthracites in the cupola, he has become partly convinced that he is not so dependent on the harder anthracite coals as be supposed.

The consensus of opinion among manufacturers throughout the territory in which anthracite is used as a fuel for melting iron is, therefore, that the cutting-off of the supply of the anthracite generally used by them did not seriously interfere with their operations. In other words, the consumption of foundry grades of pig iron has not been perceptibly lessened by the strike, while the supply has been very materially curtailed. Incidentally we may remark that quite a number of our correspondents, among them very large consumers of iron, directly and pointedly express their opinion to the effect that they have had no difficulty in getting what pig iron they wanted, and that they do not in the near future expect any changes in the situation which would lead them to anticipate their requirements for fear of higher prices. Their apathy and the practical failure of what attempts there have been made to secure better prices for foundry pig point to the conclusion that the curtailment of production by the Lehigh and Schuylkill strikes has merely had the negative effect of preventing a decline. To that extent the sufferings of blast furnace men during January and February have been compensated for.

The Export Freight Problem.

The Interstate Commission have dismissed the petition of the Boston Chamber of Commerce, which asked that the Boston and Albany, the New York Central Railroads, and their connections, should be compelled to accept the same rate on domestic as on export shipments from the West to Boston. On breadstuffs from Chicago the rate is 5 cents per 100 pounds more to Boston than to New York; this difference was declared by the railroads to be fair and reasonable. On the same articles when for export the proportion of the railroads to Boston was the same as their proportion to New York, and when the extra 5 cents had been paid and the flour or grain afterward exported the additional charge was refunded; this also the railroads declared to be fair and reasonable, and, further, that the two transactions—for domestic use and for export—were separate and distinct, and neither could be taken as a criterion for the other. The opinion by Commissioner Schoonmaker sustains the railroads, in that it declares the New England traffic to be more expensive than the New York; and holds that the latter, owing to ocean facilities and railroad competition, is on a different footing. The attempt of the chamber to rely upon the fact of lower rates on export as an argument in favor of lower rates on domestic traffic was weak. In truth, the complainants relied too exclusively upon the alleged legal aspects of the case and did not sufficiently consider the transportation difficulties; thus when the railroads showed clearly how the greater part of New England shared the Boston rates, and that any change under present conditions would benefit Boston at the expense of the other cities and sister States, the chamber had no answer ready. The only true ground for asking the reduction—that New England needed cheap bread if she was to continue to manufacture and the railroads to carry her products—was not dwelt upon and could not have been well expressed in figures. In all cases against the railroads before the Interstate Commission, it must not be forgotten that the commission is not merely a legal body but is formed to decide transportation questions according to transportation principles. He who cannot give good transportation reasons for his complaint has prejudiced his case from the outset.

All this has a direct bearing upon the export problem at all the seaboard cities.

In effect the commission say that a domestic rate and an export rate have little relation to each other, and each must be judged by its own circumstances. Reflection, we are sure, will convince all that this is a sound principle. On goods for domestic consumption, the railroads are entitled to such a rate as will yield a fair revenue; but on exported flour, wheat and provisions they must take any rate which will yield them anything after paying movement expenses. The latter traffic is taken to London in competition with the Indian and South American product and must be sold there at prices fixed by this competition. The freight charges must be deducted from this price and the balance is the price to the American exporter and farmer. Under these circumstances it needs no extended argument to show that the railroads would be justified in accepting a lower rate to the seaboard on breadstuffs and provisions when for export than when for home consumption. Our railroads have announced that they will abandon their recent method of quoting a through rate from Chicago to Liverpool and return to the old method of quoting to the seaboard only. The Liverpool rates were largely cut, but it should not be forgotten that when last fall seaboard rates only were quoted the cutting was also heavy on export shipments. It was this which led to the system of Liverpool through rates, now given up. Will a return to the old system insure stability on shipments to Europe? We think not, and that in the nature of things we cannot expect it. The difficulties in the way of arranging rates, so that each of the seaboard cities shall have a share of the traffic to Europe, are great enough, but it will only complicate matters to persist in considering the domestic and export traffic as one. Such a union can only be made to be broken, and, without some system better than the old, we many expect to see the old troubles renewed with it. The manufacturers will watch with interest the course of the railroads in solving the export problem, for after the question of export rates on breadstuffs will come the question of export rates on manufactures.

Late Developments in Central America.

During the past twelvemonth Central American affairs have again begun to attract a good deal of attention—in the first place, on account of the union movement which has made some headway, and in the second place on account of the new surveying expedition sent out from the United States in connection with the revived plan of a Nicaragua Canal. The idea of bringing about a political and economical union between the five republics cost General Barrios his life while attempting to force it upon the republics south of Guatemala, but the idea has not been abandoned, and last spring a diet assembled in Guatemala whose aim was "to establish an intimate relationship between the five republics, and, by making the continuance of peace certain, provide for their final fusion into one country." A treaty containing 32 articles was concluded in consequence. Some 30 years ago they had been united, but clashing interests subsequently caused a disruption. Now, however, the necessity is felt to renew the old compact in some mutually suitable shape. This feeling arises from the necessity which is felt to form a strong central Government capable of defending the interests of all, especially at a time when interoceanic routes, whether by rail or by canal, give such great importance to that portion of our continent. A well-constituted Central America will be in a better position to treat with Mexico on the one hand and with Colombia on the other, and by promoting mutual economical and commercial interests by consolidation the finances of all of them offer better guarantees to American and European capitalists for any future loans than each republic could offer by itself.

Guatemala, Salvador, Nicaragua, Honduras and Costa Rica combined cover an area of 445,900 sq. km., with a population of about 3,000,000. The capitals are: Guatemala, with 60,000 inhabitants; San Salvador, with 14,000; Managua, with 15,000; Teguigalpa, with 12,000, and San José, with 14,000. The strength of the permanent army is 7000, and there is besides a militia force of 60,000. The public debt of Costa Rica is $11,942,000; that of Guatemala, $11,207,723; that of Honduras, $900,000; that of Nicaragua, $1,271,704, and finally that of Salvador, $3,046,198.

As for railroads, there are 282 km. in operation in Costa Rica, 116 in Guatemala, 74 in Honduras, 143 in Nicaragua, and 46 in Salvador. Telegraphs, there are 622 km. in Costa Rica, 2905 in Guatemala, 2158 in Honduras, 2090 in Nicaragua, and 1624 in Salvador. Communication by telegraph now exists between Guatemala, the Northern republic, and Mexico, and it will not be long before the railway will be in operation which is to connect Guatemala with the Mexican system. The import of merchandise into Costa Rica in 1885 amounted to $3,661,000; into Guatemala, in 1886, to $3,537,000; into Honduras, to $1,500,000; into Nicaragua, to $2,800,000, and into Salvador, to $2,646,628. The export is considerably in excess of the import in several of the republics. Thus in the years named Costa Rica exported $3,297,000; Guatemala, $6,736,000; Honduras, $1,600,000; Nicaragua, $2,443,000, and Salvador, $6,065,799. The American trade was as follows with the five republics taken together:

Fiscal year.	Imports into the United States.	Domestic export.
1887	$7,637,651	$2,861,126
1886	5,915,413	2,442,171

The increase in importation from Central America, as shown above, is due to the rise in coffee, which is the chief staple. Planters are at present in a most flourishing condition. Although the price since June last has receded 40 per cent. it is still high enough to pay a very handsome return. Honduras in particular is a great gold and silver mining country, where American capital is extensively invested in active mining enterprises. Should the union take a tangible, permanent form, it is to be foreseen that not only in several of the republics the transcontinental railways now being built will soon be finished, but that a line running from north to south will traverse them all to the borders of Colombia.

There is no scarcity of hands for agricultural and mining purposes anywhere in Central America, most of the aborigines belonging to the class that tills the soil, and readily works even in mines for moderate wages. The climate of the plateau is by no means hot, and it is healthy besides, so that white labor can be employed on the coffee estates. There is even some textile industry in Guatemala. It will not be difficult to attract European immigration on a larger scale than has hitherto been the case.

The Nicaragua Canal project has attracted increased attention since the Panama Canal is beset with financial and engineering difficulties of an apparently insurmountable kind, and may have to be abandoned altogether, even in the modified shape now proposed by M. de Lesseps. Everything points, in fact, to Central America as one of the portions of our continent which will make great headway economically and commercially in the near future, and where American capital will continue to meet with good opportunities for safe and profitable investment in a great variety of ways; hence the interest which attaches to the country from our point of view.

Needed Reforms in Our Patent Laws.

Year after year attention is called by the proper officers and by the press to the necessity of important modifications in our patent laws, yet one session of Congress after another is frittered away in wrangles in which the country has little concern, while important legislation is either rushed through at the last hour or is entirely neglected. With little to expect and much to fear, the feeling is growing among business men that adjournment brings welcome relief. Though there is little hope that any more will be done this year as compared with last, the recommendations by Benton J. Hall, Commissioner of Patents, in his last annual report to Congress deserve careful consideration by inventors and manufacturers.

Among the flagrant methods adopted to circumvent some of the leading provisions of our patent laws not one is so striking as the distortion of Sections 4885 and 4894 so as to considerably extend the life of a patent. Under the first section named an applicant has six months within which to pay his final fee, and by taking advantage of this leniency may secure the dating of his patent six months after the patent has been granted. Under the second section an applicant is allowed two years to complete or perfect his application for patent. Any action of the Patent Office requiring a change or some formal correction can be followed by a further delay before the applicant is required to take any action in response. The Commissioner states that in this manner applications now in the office have been kept alive nine or ten years. It will be readily understood how, by such subterfuges, important inventions can be given a monopoly far beyond the time so liberally allowed by our laws. While the patent application is being nursed along in the Patent Office a manufacturer may be putting the article on the market, warning the public that a patent is applied for. To remedy such abuses the commissioner asks that a patent be dated from the day on which it is allowed, even if the final fee is not paid, the six months' grace

being continued. He suggests that, under proper restrictions, the office be given power to declare any application forfeited for want of prosecution, whenever it is evident that nursing is going on. It is absolutely necessary that all the safeguards to protect and encourage meritorious inventions be maintained, but some means should certainly be devised to prevent a distortion of the very provisions adopted for that purpose into pretexts for preempting promising avenues of progress by individuals or manufacturing firms. Usually it is the class of powerful and influential manufacturers who exhaust all means to delay the issue of patents. It is manifestly unfair that by technicalities they should succeed in prolonging the life of their patent five or ten years.

Another very important subject which the commissioner brings up again for consideration is the limitation of the term of a United States patent by the expiration of a foreign patent. He recommends that this clause be repealed, on the ground that "it is a source of much vexation to inventors, and of trouble to the Patent Office, and is out of harmony with the spirit of our patent law." The idea which guided in the framing of this provision was that foreign manufacturers should not be in enjoyment of an American invention which had expired in their own country, while American producers and the American public continued to pay tribute to the inventor or to those who had acquired his exclusive rights. It is urged against this view of the case that there should be no distinction between an American inventor who patented abroad and one who confined himself to a United States patent. Under the present law the American inventor is certainly in a very uncomfortable dilemma. If he takes out an American patent first he is debarred, by the very act of publishing his invention, from securing rights in a number of other important countries, notably Germany. If he takes out foreign patents the life of his American invention is limited to that of the shortest duration of his patents abroad.

Another point brought out is that the provision in question practically defeats the accession, last year, of the United States to the International Union for the Protection of Industrial Property. Our system of granting patents, since it is preceded by an examination of the novelty of the invention, often consuming considerable time, makes it a matter of frequent occurrence that the foreign patents are granted first. Under the treaty the American patent—the term of the domestic patent—is abridged.

It is evident that both public policy and a due consideration of the rights of inventors dictate that the abuses alluded to be checked by supplementary legislation, and that the proposal to abandon the provision which limits the life of an American patent by the expiration of the foreign patent having the shortest term be adopted.

The driven-well patent cases, so long in litigation, have at last received a quietus from the United States Supreme Court. On Monday a decision was rendered upon the application for a re-hearing of the case of William D. Andrews and others against George D. Hovey, known as "the driven-well case." The court holds that the patent issued to Nelson W. Green, in 1871, for an improvement in the method of constructing artesian wells, was invalid, because the invention covered by it was in public use more than two years before Green applied for the patent. The application for a rehearing is denied.

CORRESPONDENCE.

The Bar Iron Card.

To the Editor: The question of extras on bar iron, and latterly on soft steel bars, is one that is constantly arising between the buyers and the manufacturers. During an active season, like that of the past year, the buyer is generally too glad to get his material to make any objection to the card list, but when dullness reigns the warfare commences, and the result simply depends upon how anxious the manufacturer is to sell.

When the first list was adopted by the Eastern association, in 1869, the whole theory of extra prices for extra sizes was based upon two general conditions: 1. The protection afforded by the customs duties upon extra sizes. 2. The extra cost of producing sizes either sparingly called for or of which but a limited weight can be produced in a given time. At that time foreign competition was the thorn that pricked the worst, home competition was not as fierce as to-day, and what there was became greatly modified through the frequent pleasant gatherings of mill owners at New York, Philadelphia, Coney Island, Long Branch, and, when good fishing was desired, at Cresson. Necessarily, the classification in many instances had to be arbitrary—for instance, both Western and Eastern associations agreed that 2½-inch rounds should be $\frac{1}{10}$ cent per pound more than 2-inch rounds. No one could say that this represented the increased cost, if any existed; a line had to be drawn, and it was drawn at the duty line. The Eastern classification has been modified at different times; the list as it now stands was adopted October 16, 1879. It was formulated after months of hard work by a committee of practical men after consultation with most of the Eastern mill owners, and many merchants. The best evidence of its fitness exists in its survival. It has been attacked on all sides, merchants swear at it in purchasing, and by it in selling. Consumers, as a rule, accept of it as a necessary evil, and only seek to have it modified, or removed, in specialties, the quantities used of which are sufficient justification. Iron mills, East and West, at various times during the past 15 years, have issued special lists of their own. This course has been recently followed by a prominent Ohio firm. These lists have but little effect on the market. No one firm in the country is big enough to set aside the lists of the two associations.

There is no questioning the fact that the present lists need a thorough modification; the conditions affecting the list are widely different from those existing even at its last revision. There is now no practical reason why the West and the East should not unite in a list that would be acceptable to the whole country. No list can be devised that will not be cut, for "necessity knows no law;" but a list can be formulated that will largely remove the present temptations to cut. The new Youngstown list is no improvement in this direction; it "keeps the promise to the ear, but breaks it to the hope." Let any merchant buy 500 tons of well assorted bars and rods by the Youngstown list, and duplicate the purchase by the Eastern list at the same base, and the latter will cost him the smaller amount. A thorough comparison of the two lists will prove this. I can only cite a few instances. The Eastern list gives all flats from 1 inch to 6 inches wide by $\frac{5}{8}$ to 1 inch thick at base. The Youngstown list charge extra on all flats except those between 1¼ to 4 inches wide. On flats 4¼ to 5¾ wide, from 1⅛ to 1½ thick, there is no extra on Eastern list. Youngstown charge ¼ cent per pound. On thick flats 2¼ to 4 inches wide the East charge two-tenths extra; the new list five-tenths. On rounds and squares ⅝ to 1⅛ inch, which are largely used, there is no Eastern extra; the new list charge half a tenth, and so on. I have taken too much space, but the subject is a vital one to rolling mill owners. I give it as my deliberate opinion that no mill East or West can sell at present base prices and cut the Eastern list of extras one-half without sooner or later going into bankruptcy. Let them be modified by the mills in concert, and thus prevent the multiplicity of lists that now bid fair to annoy both buyer and seller. Yours respectfully, OLIVER WILLIAMS.

CATASAUQUA, PA., February 18, 1888.

Puddling Direct Metal.

To the Editor: In your issue of February 2 I notice an article, "A New Departure in Puddling Iron," from which I make the following extract:

> The iron trade generally will be interested in a statement of the recent achievements by the North Chicago Rolling Mill Company. For three months experiments have been in progress at the Milwaukee works of this company in puddling iron conveyed in liquid form from the blast furnace to the puddling furnace. So far as is known this is the first successful attempt in puddling blast-furnace metal, and the North Chicago Rolling Mill Company may feel proud of their achievement.

The following is an extract taken from the work of W. Turan, C. E., published in London, England, in 1862:

> Boiling crude iron direct from the blast furnace is practiced to a limited extent. By operating in fluid iron the coal consumed in melting the cold pigs, amounting to one-third of the entire consumption, is saved, and the certainty obtained that all the iron is perfectly melted before boiling commences, thereby insuring the greatest uniformity in quality. Yet notwithstanding the acknowledged superiority of the boiling process in direct connection with the blast furnace and the period which has elapsed since the system was first adopted the number of furnaces working on that plan is not large. The necessity of reconstructing the forge and bringing it inconveniently close to the blast furnace is a great objection to its extensive use in existing works, while in the erection of new ones the contracted space permitted for carrying on the operation of the blast furnace is a disadvantage.
>
> The huddling together of boiling furnaces so that they may be as near as possible to the furnace operates against the success of this mode of working in close weather. A puddling forge cannot be too open in summer time. Suspension of operations through the exhaustion of the men, produced by the heat involved by the blast and adjacent boiling furnaces, is a common occurrence in these forges, and exists to a greater or less extent in some others. The make of a double boiling furnace averages 36 tons weekly. Working on hot iron from the blast furnace the make is as high as 46 tons weekly. Similar furnaces at the Chillington forges, Staffordshire, produce about 28 tons weekly.

Some years ago an English manufacturer told me that the Chillington Iron Company, of Wolverhampton, England, took iron direct from the blast furnace about 40 or 50 years ago. The iron was taken direct from the blast furnace in a liquid state to the puddling furnaces, and the puddle bars produced were first class. Thirty single furnaces worked this method for 10 or 12 years. This mill manufactured rails, and the reason it was abandoned was that the Bessemer process made a much better and cheaper rail.

The process of taking liquid iron direct to the puddling furnace has also been in operation in other mills. But the plan adopted was to use a cupola to remelt the iron and the cost was too high, and it also used a much larger quantity of ore to "fix" with. Yours very truly,

ROBERT C. FULTON,
Gen. Sup't Plymouth Rolling Mill Co.
CONSHOHOCKEN, PA., February 14, 1888.

William Kelly.

BY MARCUS BENJAMIN.

Few inventors have been successful in achieving the rewards and reputation they are justly entitled to during their lifetime. Those inventors who have obtained recognition have done so in spite of almost determined opposition. When Sylvester Marsh appealed to the Massachusetts Legislature for permission to build his railroad up Mount Washington the distinguished members of the body offered to "throw in a charter to the moon" if he desired. A clever Swiss engineer visited the road while it was in course of construction, and the Rigi Railroad was the result.

Whether the Bessemer process was original with its English inventor it would be difficult to determine, but certain it is that "the first experiments in the conversion of melted cast-iron into malleable steel by blowing air in jets through the mass in fusion, appear to have been made by William Kelly, an iron master at the Suwanee furnaces, Lyon County, Ky., U. S."*

WILLIAM KELLY.

William Kelly was born in Pittsburgh, Pa., on the 22d of August, 1811. He died at Louisville, Ky., on the 11th inst. Of his early life we have only meager details. He received a common school education and while still a boy showed his fondness for mechanics by constructing a tin steam engine and boiler. When he was 18 he built a propelling steam wheel and four years later a rotary steam engine. These facts are pertinent and indicate a constructive ability of a high order. Subsequently he engaged in the commission and transportation business in Pittsburgh, also owning interests in steamboats on which came consignments that he sold and on which were returned supplies that he purchased. In 1845 his warehouse was destroyed by fire, and he removed to Kentucky. The property on the Cumberland River in Lynn County, known as the Eddyville Iron Works, including the Suwanee furnace and the Union forge, was purchased by him, and with his brother, John F. Kelly, he began the manufacture of iron. At the Suwanee furnace, which was 3 miles from the forge, about half the metal produced was converted into large sugar kettles, made in cast-iron molds of his own invention, which found their way to the sugar plantations of Louisiana and Cuba, while the balance of the metal was conveyed to the forge situated on the river and then worked into charcoal blooms by the knobbling process. The latter was held in high reputation and were almost entirely used for making boiler plates, so that many steamboats on the Ohio and Mississippi Rivers were using boilers made of this iron.

Owing to the great cost of fuel he began experimenting in 1847 in the direction of decarbonizing the iron by the introduction of a current of air. He says: "I conceived the idea that after the metal was melted the use of fuel would be unnecessary—that the heat generated by the union of the oxygen of the air with the carbon of the metal would be sufficient to accomplish the refining and decarbonizing of the iron.* After devising several plans for testing this idea he finally began experimenting with a small blast furnace, having a hearth and bosh similar to the ordinary type. Into this he introduced two tuyeres, one above the other, the upper one being for the purpose of melting the stock, while the lower one, fixed near the bottom of the hearth, was intended to conduct the air into the hearth. The lower part of the hearth was made to separate from the upper portion, so that when the iron was blown to nature by the lower tuyere the draw could be run from under the hearth.

These experiments he continued, but not persistently, until 1851, when, on the completion of his new blast furnace, the Suwanee, he renewed his investigations. Important improvements were now tried with considerable success. They consisted in separating the melting from the decarbonizing departments, so that the crude metal as it came from the blast furnace was run into a converter which was provided with three tuyeres. A powerful blast of air was then turned on through the tuyeres and the fluid metal run into the converter, which immediately commenced to boil violently. The blast was allowed to act on the metal for 15 or 20 minutes, until the carbon of the metal was oxidized, when the converter was tapped and the metal run out into molds.

The first converter is described by his son, Mr. William C. Kelly, as follows:† It was a square brick structure about 4 feet high. Inside the converter was cylindrical and about 15 inches in diameter, with a concave bottom, in the center of which was a tile perforated with small holes for tuyeres. Under this tile was a small blast air-chamber, into which the blast-pipe entered. The interior of this converter was almost identically the same as that now used in the pneumatic or Bessemer process. The mode of operating it was simply, after turning on the blast, to charge the molten metal in at the opening in the top with hand ladles from the hearth of the blast furnace. The first trial of this furnace was satisfactory, and in a short time Mr. Kelly obtained iron that would forge well. Specimens of the first pieces of malleable iron or steel ever made by the pneumatic process are still in the possession of the Kelly family, and the converter can be seen at the Cambria Iron Works, Johnstown, Pa.

Continuing his experiments, he subsequently built a new converting vessel and placed it in the pig bed convenient to the tapping hole of the hearth. The new furnace was circular, built of boiler plate, about 5 feet high and 18 inches inside diameter, and instead of blowing up through the bottom, the blast was applied to the sides above the bottom through four ¾-inch tuyeres. Ultimately it was found that a single tuyere an inch in diameter gave the best results, and in this converter 15 cwt. of metal could be refined in from five to ten minutes. This method became known as "Kelly's air-boiling process;" and his son, William C. Kelly, says in his notes,* in explanation of why the invention was not made known to the world, that "a certain firm wrote to Kelly & Co. for quotations for best charcoal blooms, stating, "We understand you have adopted a new method for refining your metal. Is this so? We want our blooms made in the regular way," and very clearly intimating that none would be purchased except those made in that way. When it is understood that these blooms entered chiefly into the manufacture of boiler plate, it can be readily appreciated how the purchaser would be cautious and particular about their quality, and be very much prejudiced against any new way of making them, especially when the new process consisted in the discontinuance of refining the metal with charcoal as fuel, as it was this distinguishing feature which characterized forged blooms as superior to common boiled or puddled iron. This was not the only insinuation of the kind received, and the proprietors of the Suwanee Iron Works became painfully aware of the fact that it would be ruinous to their business to let it be known to their customers that they refined their iron by a pneumatic process. Moreover, Mr. Kelly was desirous of further perfecting his invention before taking out patents, and naturally it was preferable not to make it known until they had been secured.

As soon as Bessemer brought out his process in England Mr. Kelly at once applied for a patent and placed the matter in the hands of a well-known patent firm, who, it is claimed, retained the papers long enough to inform Mr. Bessemer and allow him to get out his patent, after which they notified Mr. Kelly that they had been engaged by other parties to obtain a patent for the same invention. However, a caveat was granted by the Patent Office and the claim of Mr. Kelly was duly heard by the Commissioner, who decided that Mr. Kelly was the first inventor, and entitled to a patent, which was accordingly

* "Bessemer Process of Refining Iron," by Zerah Colburn.

* Swank's "History of the Manufacture of Iron in All Ages," page 304.

† *Am. Manufacturer and Iron World*, 1881.

* *Am. Manufacturer and Iron World*, 1881.

issued. In May, 1863, E. B. Ward, of Detroit, Mich.; Daniel J. Morrell, of Johnstown, Pa.; William M. Lyon and James Park, Jr., of Pittsburgh, Pa., and Zoheth S. Durfee, of New Bedford, obtained control of the patent of Mr. Kelly and organized the Kelly Process Company, under an agreement which gave the inventor and his representatives an interest, which has been valuable. Experimental works were established at Wyandotte, Mich., and Mr. Durfee was sent to England to procure an assignment of Robert F. Mushet's patents, which had been found essential to the success of the process. This purpose having been accomplished, Mr. Mushet, Thomas D. Clare and John N. Brown, of England, were admitted to membership in the company.

In the autumn of 1864 Mr. William F. Durfee succeeded in making, at his experimental works at Wyandotte, the first steel ingots ever made by the pneumatic process in the United States; and, on 25th May, 1865, the first steel rails ever made in the United States were rolled from steel ingots. Meanwhile Alexander L. Holley had, in the interest of John F. Winslow and John A. Griswold, of Troy, N. Y., secured the patents of Henry Bessemer for the United States, but without the use of Mushet's patents they could not successfully produce steel; and, on the other hand, the Bessemer machinery was essential to the Kelly process. Therefore, in 1866, the interests of the several patentees were consolidated under the title of the Pneumatic Steel Association.

Application was made at the United States Patent Office, in 1871, for the renewal of the Bessemer, Mushet and Kelly patents, and the claims of the two former were rejected, while a renewal of seven years was granted to Mr. Kelly, it having been shown that he had not been sufficiently remunerated, having only received about $30,000 for the use of his patent, against $25,000 expenditures.

WASHINGTON NEWS.

(*From Our Regular Correspondent.*)

WASHINGTON, D. C., February 21, 1888.

There is every indication of a general backdown on the part of the advocates of the ultra scheme of surplus revenue reduction involving methods pointing in the direction of free trade. Two important events in that line have transpired within the past few days. A prominent protection Democrat from New Jersey called upon the President on some other business. The conversation soon turned upon the reduction of the revenue, and the inability of the Committee on Ways and Means to reach a solution of the puzzling problem. The Representative referred to the President's message as an obstacle in the way of a settlement, as the extreme wing on tariff revision were disposed to come up to the line marked out as a vindication of the Administration and the conservative ring could not co-operate on account of local interests. The President said that he regarded his message as simply setting forth the tariff question as an abstract proposition, and in the line of what he considered Democratic doctrine. He said that he could see that a bill based on his recommendations could not pass at this time, and, therefore, he was willing to accept the next best thing, which would be a compromise measure. He said that he had nothing to suggest as a substitute, but would sign any bill which covered revenue reduction, even if it ignored tariff revision entirely and made the cut on internal revenue repeal.

The President pressed upon the Representative's attention two important facts—first of all, the imperative demand for revenue reduction, which must be prompt and effective in order to preserve the monetary and trade equilibrium of the country. The other, the political importance of going before the people of the country in the approaching campaign with some action taken in the line proposed. In the event of failure to reduce the revenues which would more directly affect the interests of business, he did not wish the responsibility to rest upon the Administration or upon the majority in the House. The Representative assured him of his efforts to facilitate an agreement, as it was generally understood that the recommendations of the President presented the ultimatum, and to vary from that line would be a rebuke to the Administration, and those who had their own constituencies to look after were threatened with reading out of the party.

The Representative who had been favored with this mark of frankness on the part of the President communicated the facts to the Chairman of Ways and Means and to Mr. Randall. Chairman Mills did not fail to avail himself of this loophole of escape from the dilemma in which his committee found themselves. He called upon Mr. Randall and had a very free talk over the question, urging the importance of harmony. Mr. Randall suggested that such a measure would be feasible if both parties went at it in the spirit of compromise, but particularly if the Administration were willing to take some other basis of settlement than sweeping reductions of customs duties. There was some talk as to details, in which Chairman Mills was disposed to acquiesce, but said he could not promise that wool should not go on the free list. Mr. Randall thought that the committee might fix that as they pleased, leaving the House to determine whether it should be free or the duty readjusted in the interests of the wool growers. The effort to place coal and iron ore on the free list would be abandoned. The gentlemen agreed that a caucus should be held at an early day to talk matters over, and to get at something like a definite understanding of the views of the different members of the party on the subject. The caucus may be called very soon. In the meantime, the metal schedule and other features of a Democratic protection revenue reduction bill to be proposed by Mr. Randall will be completed.

Notwithstanding all the talk about the early report of a bill from the Democratic members on Ways and Means they seem to be as far from the end of their preliminary tribulations as they ever were. There is some ground for the belief that the whole ultra scheme will have to be abandoned and some other method of revenue reduction adopted. It is not improbable that the Ways and Means resolution authorizing the Secretary of the Treasury to purchase bonds will have to be resorted to to relieve the pressure of immediate necessity. This will save the business interests from disturbances growing out of a stringency in the money market. As far as industry is concerned the existing conditions on the tariff would remain. If nothing be done the people will be able to say how the tariff shall be revised in the Fifty-first Congress.

The American Forestry Congress, in its plea for the preservation of the valuable timber lands in various parts of the country, say: "Let it not be overlooked that the State is not only the representative of the interests of the community as against those of the individual, but also of future interests as against those of the present; that the forest is a kind of trust, of which only the usufruct belongs to the present, and that to draw upon its capital is a perversion of the trust, and can only be excused by direct necessity. Every civilized country has found, after severe punishment for not obeying the laws of nature, that private interest is not sufficient to protect this class of lands; that State ownership, or, what is more objectionable and less effective, State supervision of private forest lands, is indispensable in those regions where the forest subserves other functions than that of mere material supply. France has found it necessary to spend $30,000,000 in aid of the recuperation of needlessly devastated mountain forests, and it is estimated that $34,000,000 more will be required to correct the evils brought on by foolish disregard of nature's law."

OBITUARY.

GEORGE H. CORLISS.

George H. Corliss, the distinguished inventor and mechanical engineer, died on Monday, at Providence, R. I., at the age of 70 years. Mr. Corliss was born on June 2, 1817, in Easton, N. Y., where both his father, Dr. Hiram Corliss, and mother were born. In 1825 his father moved to Greenwich, where young Corliss attended school. After serving several years as general clerk in a cotton factory he spent three years in the academy at Castleton, Vt., and in 1838 he opened a country store in Greenwich. He first showed mechanical skill in temporary rebuilding a bridge that had been washed away by a freshet, after it had been decided that such a structure was impracticable. He afterward constructed a machine for stitching leather before the invention of the original Howe sewing machine. He moved to Providence in 1844, and in 1846 he began to develop improvements in steam engines, for which he received letters patent in 1849. In 1856 the Corliss Steam Engine Company were incorporated. Their works cover many acres of ground, and hundreds of their engines are now in use. Mr. Corliss had received awards for his inventions at the exhibitions at Paris in 1867, and at Vienna in 1873, and was given the Rumford medal by the American Academy of Arts and Sciences in 1870. In 1872 he was appointed Centennial Commissioner for Rhode Island, and was one of the Executive Committee of seven to whom was intrusted the responsibility of the preliminary work. In January, 1875, he submitted plans for a single engine of 1400 horsepower to move all the machinery in the exhibition. Engineers of high repute predicted that it would be noisy and troublesome, but it was completely successful, owing to the care of Mr. Corliss, who spent $10,000 upon it above the appropriation for building it. M. Bartholdi, in his report to the French Government, said it belonged to the category of the works of art. Mr. Corliss invented many other ingenious devices, among which is a machine for cutting the cogs of bevel wheels. The Institute of France gave him in 1873 the Montyon prize for that year, the highest honor for mechanical achievements. He made no exhibit, but the prize was awarded him because the foreign engine builders who made exhibits claimed that they were of the Corliss type. In February, 1886, the King of Belgium made him an officer of the Order of Leopold.

WM. H. MORROW.

Wm. H. Morrow, about 20 years connected with the Baldwin Locomotive Works, and partner in the firm since 1885, died on Monday, 20th inst., at his residence in Philadelphia. Mr. Morrow had general supervision of the shops, and was highly esteemed for his business ability, as well as for his general integrity of character.

HON. JOHN B. SEIDEL.

Hon. John B. Seidel, one of the oldest and best-known iron manufacturers in Pennsylvania, died at his home in Lebanon, Pa., on the morning of the 16th inst., in the 75th year of his age.

TRADE REPORT.

British Iron and Metal Markets.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, February 22, 1888.

The best brands of Scotch Pig have improved somewhat in price under the influence of quite good orders from Canada for April and May deliveries. Other brands have continued unsettled, however, in the absence of improvement in the demand for the same for either export account or home consumption. The selling pressure by the speculative interest has moderated, and this fact, together with more or less covering of "short" sales, is reflected in a slight advance in the price of warrants. Continued additions to the stocks in store, however, operate as a check upon any decided improvement for the time being. In the Middlesboro' district there has been a rather better trade at steady prices. Bessemer Pig has changed slightly for the better. Merchants are not selling as freely at the present time as they were a short time ago, and makers, being well sold ahead in many instances, are decidedly firm. The market is also affected in a measure by a threatened strike in the Cumberland district, which, should it take place, would involve about 10,000 workmen.

Prices for most descriptions of Tin Plate are lower, in consequence of more or less pressure to make sales. Offers are freely made at the prices cabled to-day, and some sales are rumored at a shade less. The weakness is due mainly to the failure of the makers to agree upon measures to reduce production. There is still a lack of harmony, and the firms that have refused to enter into previous compacts still hold aloof. Besides this, it is rumored that an apparent weakness in the Pig-Tin market is not without effect upon sellers.

The stock of Copper is steadily increasing and present indications are of a steady addition to the surplus, providing the output is not materially curtailed. The consumption is, to all accounts, falling off. Speculation in the metal on "outside" account is gradually lessening, but the "bulls" control the market. Sales are reported of 420 tons Montana Matte, to arrive, at 15/ per unit—the first transaction in American furnace material for several weeks. The Pig-Tin speculation has been slow and at a lower level of prices. There are, however, no evidences of radical change in the situation.

The Steel trade has recovered from the slight set-back occasioned by the late demoralization in the Pig-Iron market. Prices are no higher, but manufacturers display renewed confidence. It is stated that some very promising inquiries have been received the past week for railway materials from the North American colonies.

The Lilleshall Works, Leeds, are adding a new basic Steel Plant.

Scotch Pig.—No improvement in the demand. Prices still unsettled.

No 1 Coltness,	f.o.b.	Glasgow.	... ...49/
No. 1 Summerlee,	"	"	.....49/6
No. 1 Gartsherrie,	"	"	....46/
No. 1 Langloan,	"	"	.. ..47/
No. 1 Carnbroe,	"	"	.... 41/6
No. 1 Shotts,	"	at Leith..... . .....47/	
No. 1 Glengarnock,	"	Ardrossan..... .....45/	
No. 1 Dalmellington,	"	" 41/6	
No. 1 Eglinton	"	" 41/	

Steamer freights, Glasgow to New York, 5/; Liverpool to New York, 7/6.

Cleveland Pig.—The market steadier, with rather more demand. No. 1 Middlesboro', G. M. B., 34/; No. 3 do., 31/6.

Bessemer Pig.—Less pressure to sell by merchants. Makers are firm. West Coast brands, mixed numbers, 43/6, f.o.b.

Spiegeleisen.—Business moderate, but prices held firmly. English 20 % quoted at 75/, f.o.b.

Steel Rails.—The demand continues good and prices are firm. Standard sections quoted at £4, f.o.b.

Steel Blooms.—Demand still moderate and prices are unchanged. We quote at 72/6 @ 75/, f.o.b., for 7 x 7.

Steel Billets and Slabs.—Billets in good demand and Slabs quiet; prices held firmly. Bessemer 2½ x 2½ inch Billets, £4. 5/, and Nail Slabs, £4. 2/6, f.o.b.

Steel Wire Rods.—A fair business at steady prices. Mild Steel, No. 6, quoted at £5. 18/9, f.o.b.

Old Rails.—Offerings still moderate and holders firm. Tees quoted at £3, and Double Heads £3. 2/6, c.i.f., New York.

Scrap Iron.—Demand light and prices nominal. Heavy Wrought at 47/6 @ 50/, f.o.b.

Crop Ends.—Moderate sales at about previous rates. Bessemer quoted £2. 5/ @ £2. 7/6, f.o.b.

Tin Plate.—The market weak, under free offerings and moderate demand. We quote, f.o.b. Liverpool:

IC Charcoal, Allaway grade	.....16/3 @ 16/6
IC Bessemer steel, Coke finish	.....14/6 @ 14/9
IC Siemens " " "	.....14/9 @ 15/
IC Coke, B. V. grade	.....14/6 @ 14/9
Charcoal, Terne, Dean grade	..13/9 @ 14/

Manufactured Iron.—There is still a good trade and prices remain firm. We quote, f.o.b. Liverpool:

	£	s.	d.		£	s.	d.
Staff. Ord. Marked Bars	7	10	0	@	..	..	..
" Common "	5	2	6	@	5	5	0
" Bl'k Sheet, singles	6	15	0	@	6	17	6
Welsh Bars (at Wales)	4	15	0	@	..	..	..

Tin.—Trading moderate and prices somewhat irregular. Straits closed at £165. 10/ @ £166, spot, and £143 @ £144, three months' futures.

Copper.—The market quiet, but prices held firmly. Chili Bars closed at £77. 15/ @ £78. Best Selected, £79.10 @ £80.

Lead.—A fair business at steady prices. Soft Spanish, £14. 10/ @ £14. 15/ at the close.

Spelter.—The market has ruled firm with fair demand. Silesian, ordinary, £19. 5/ @ £19. 10/ at the close.

Financial.

OFFICE OF THE IRON AGE,
WEDNESDAY EVENING, February 22, 1888.

The one bright feature in the week is the resumption of work in the Schuylkill collieries, nearly all of which have started up, giving employment to some 15,000 hands. In the Lehigh region the miners still persist in their demands. Our local coal trade is, if possible, more stagnant than before, neither sellers nor consumers daring to stir. For some time to come the line trade on the Reading route is likely to absorb all the coal that can be mined before it reaches the tidewater markets in any amount. An offset is found in the disastrous failure of Graff, Bennett & Co., iron manufacturers, of Pittsburgh, with liabilities estimated at $1,200,000, of which one-half is unsecured. The Sugar-Trust investigation, under direction of the Senatorial Committee, excited unusual interest, particularly that part of the testimony given by Geo. H. Moller and Harvey O. Havemeyer, the latter showing that certificates to the value of $45,000,000 were held by the board, while the former showed that the various refiners in the combination received for their respective properties certificates in amounts as follows: Havemeyer & Elder between $16,000,000 and $17,000,000; De Castro & Donner, a little over $3,000,000; Matthiessen & Weichers, $6,500,000; Oxnard Company, $750,000; Moller & Sierck, $1,150,000; Dick & Meyer, $3,000,000. Matthiessen & Weicher's refinery was in New Jersey. Of other refineries outside of this State the Standard, of Boston, got $2,750,000; the Bay State, $900,000; and one other of Boston $1,900,000. As to prices, Mr. Moller testified that by doing away with competition refined sugars were made higher, but as to raws "nobody can rule the market, because all the world comes in." Before the combination, refiners were doing a business without profit.

A source of congratulation in business circles is the settlement of the fisheries difficulty with Great Britain, which, according to the text of the treaty now published, is construed as conceding and absolutely securing every right which Americans have claimed as necessary for the prosecution of their trade. Moreover, by a modus vivindi protocol, a temporary arrangement is made, to take effect at once, until the treaty itself shall be formally ratified. It is agreed by the British and Canadian agents that American fishermen, on the payment of $1.50 per ton of tonnage dues, per year, may enter all the bays and harbors of Canada and Newfoundland, transship their catch, ship crews, buy bait, ice, seines, lines and all other supplies and outfits, and need not report, enter or clear in any harbor or port, unless they communicate with the shore or remain more than 24 hours.

Dullness is characteristic of nearly all branches of trade, for which an explanation is readily found in the reaction from speculative movements, the bad condition of country roads and disturbance caused by strikes, as well as the uncertainties of legislation in Congress. For all this there are signs of a good trade when the spring opens. Dry goods jobbers are already doing well. An important feature in the wheat trades has been the reduction in storage rates by the Chicago elevator managers. The revised schedule will make the cost of carrying a bushel of grain per annum 9¾¢, against a former cost of about 15¢. Exporters from New York are favored by easier freight rates by the English steamers. Breadstuffs tend in buyers' favor. Oats gained slightly for spot stock. Cotton spots are $\frac{1}{16}$¢ lower. For coffee there is no demand. Provisions are firm. Petroleum steady. Lard firm. Sugars quiet.

The weekly bank statement showed a loss of $2,205,900 in surplus reserve, owing entirely to a reduction of $3,132,600 specie, large amounts having been shipped East and to the Middle States. The other items showed no important changes except in case of deposits, which reflected the loss in specie. Loans were slightly contracted. These changes leave the surplus reserve at $17,937,375, compared with $20,143,275 this time last year.

A circular issued in Wall street showed that since January 1 $69,344,000 new railroad bonds have been issued and offered for sale, though of the total there are $15,344,000 brought out to take up old issues, leaving $54,000,000 absolutely new to be absorbed by investors. Railway earnings for February, so far as reported, show a gain of 10 % on those of last year.

According to the Custom-House report the exports of specie for the week amounted to $679,000, and the imports $349,000, making the aggregate since January 1 $3,466,820 and $777,742 respectively, as compared with $2,619,000 and $3,475,000 for the same time in 1887. Sterling exchange was yesterday advanced to $4.85½ on account of the scarcity of commercial bills. There is still a large movement of securities and especially of railroad bonds to Europe, thus preventing a greater advance in the rates of exchange. A week ago the Bank of England discount rate was reduced from 3 % to 2½ %, the third reduction since January 12. The lethargic condition of the money market is attributed by the *Economist* to political uncertainty.

The Stock Exchange market on Friday suddenly rallied from the extreme dullness noticed for some time past, and became buoyant on the announcement that the Reading strike had been declared off. Reading advanced 2 % and remained strong until the close in spite of realizing sales. The Grangers also advanced in prospect of a settlement of the Western rate war at the conference in Chicago. On Saturday Reading was again the most active on the list, but weakened under a pressure to sell. The unfavorable bank statement had little influence. On Monday the market was only moderately active, and generally lower. On Tuesday prices advanced, closing strong. The bulk of the business done was in the coal shares, St. Paul and Richmond Terminal. To-day being a legal holiday the Exchange is closed, together with all banks and places of business. The project of a Clearing-House system for the Cotton Exchange has met with the general approval of the members.

United States bonds closed as follows:

U. S. 4 ½s, 1891, registered	106¾ @ 107
U. S. 4½s, 1891, coupon	107⅝ @ 108
U. S. 4s, 1907, registered	125¾ @ 125¾
U. S. 4s, 1907, coupon	125¾ @ 125⅞
U. S. Currency 6s, 1895	120 @ 123
U. S. Currency 6s, 1896	122 @ 125
U. S. Currency 6s, 1897	124 @ 127
U. S. Currency 6s, 1898	127 @ 130
U. S. Currency 6s, 1899	130 @ 133

The imports of merchandise at this port for the week were again in full proportions, the total being $9,778,700, of which $3,209,600 represents dry goods. Since January 1 the total is $65,604,688, against $61,233,757 for the corresponding period last year, and $56,212,843 in 1886. The exports for the week were valued at $5,472,458, making a total since January 1 of $41,288,152, as compared with $36,172,000 for the same time last year and $45,502,000 in 1886.

Witherbees, Sherman & Co., of Port Henry, N. Y., offer for sale 150,000 tons of "Old Bed 21" selected lump for puddling, at $4.50 per ton, and 225,000 tons of furnace ore at $2.75. The terms are as follows: "Payments to be made by satisfactory paper at four months, with interest at 6 per cent.; a separate note for each calendar month's delivery to be dated and given on the 15th day of the month following the delivery. If the purchaser shall elect to pay cash for any month's delivery on or before the 15th day of the following month, an abatement of 50 cents per ton will be allowed on selected lump for puddling, and 25 cents per ton on furnace ore. These prices are intended to apply only to contracts for specific quantities of ore which may be made before the first day of May next. If on or after that date, and during the current year we should conclude to reduce prices, all parties who may contract before that date will have the benefit of the reduction. But if on or after that date we conclude to advance prices, such advance shall not apply to any contract made before the said date."

NEW YORK.

American Pig.—The market remains quiet, and the settlement of the Reading strike, holding out as it does an early ending of the Lehigh troubles, is looked upon as indicating the probability of an easier market. A large number of letters received from leading founders and machinery builders prove that their consumption of Pig Iron has practically not been influenced by the strike. This is an important point, since it proves that the falling off in consumption, apparent from the ease in the market in spite of the curtailment of the supply, is quite independent of the coal trouble, so far at least as foundry grades are concerned. Forge continues weak, chiefly because the bulk of what Pig is being made in the Lehigh Valley is of this grade. We note a sale of 1000 tons of an extra good Forge Iron at $15.85 at Lehigh Valley furnaces, equivalent to about $16.75 at tidewater.

Scotch Pig.—The market is dull, at $20.75 @ $21 for Coltness, $19.50 @ $19.75 for Summerlee, $19 @ $19.50 for Eglinton, $20 @ $20.25 for Glengarnock, and $19.50 @ $20 for Clyde.

Bar Iron.—We quote in carload lots on dock, 1.75¢ @ 1.80¢ for Common; 1.80¢ @ 1.90¢ for Medium, and 1.90¢ @ 1.95¢ for Refined, with half extras.

Structural Iron.—Mills are still busy on old contracts, and, contrary to usual experience, have had little or no opportunity to work for stock as they usually do in this season of the year. Except the Thames Bridge, at New London, to be let next month, no very important bridge specifications are at hand. Architects and contractors are, however, beginning to send inquiries for work for the spring, and building in this immediate vicinity promises to be quite active. We quote Bridge Plates at 2.10¢ @ 2.20¢; Angles, 2.25¢ @ 2.40¢, and Tees 2.75¢ @ 2.90¢ in round lots on dock, and Beams and Channels at 3.3¢.

Plates.—Plates are weak. We quote Iron Tank, 2.15¢ @ 2.25¢; Shell, 2.4¢ @ 2.5¢; and Steel Plates, 2.4¢ @ 2.7¢ for Tank, 2.75¢ @ 2.95¢ for Shell, 3¢ @ 3.25¢ for Flange, and 3½¢ @ 4½¢ for Fire Box.

Steel Rails.—We note sales aggregating 25,000 tons, including some small lots, and some transactions of recent date not yet reported. In spite of reports a good many mills are eager for work, and competition continues keen. We quote $31.50 @ $32.

Wire Rods.—Since the American mills have been pretty well filled up, importers look for business in the near future. Wire drawers, however, are uncertain, and seem inclined to test the endurance of the German combination by keeping out of the market till the last moment. Importers ask $41.50 for Rods, but report no business. Some of them have still Rods to come, bought some time since at lower prices.

Old Rails.—The market has been very quiet. We quote $22 @ $22.25 for Tees and $23 @ $23.25 for Double Heads.

Mary S. Leng has been appointed administratrix of the late John S. Leng, Iron and Steel importer, who died on the 1st inst. The business will be continued at the same place, No. 4 Fletcher street, by his successors, John S. Leng's Son & Co.

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, PA., February 21, 1888.

Pig Iron.—The partial settlement of the strike in the mining districts is expected to result in a marked increase in the demand for Iron. Very few of the large consumers have placed their orders for Pig Metal, but with labor in a satisfactory condition, and prospects of a full supply of fuel, it is thought that both sides will now desire a definite understanding in regard to prices and deliveries covering the period up to midsummer. In the absence of transactions of this character it would be a little premature to say what sort of prices will prevail; but, judging from present indications, they will have to be somewhat lower before buyers take hold freely. Some of the leading furnaces are in a position to stand firm on current quotations, but there are others that want business, and intimate a willingness to take it on terms favorable to buyers providing that direct offers for round lots are promptly given. On the whole, it is thought that the position is improving; as consumers are ready to talk business on a liberal scale, and while they will require and doubtless obtain concessions of more or less importance, the deadlock in business will be removed and cost adjusted in accordance with the times. In some quarters there are indications of a very large consumption, while in others prospects are not quite so encouraging. The average perhaps will be considerably larger than during the past two or three months, but not likely to come near that of the first half of 1887. Still there is a better feeling, which may develop a large business during the next few weeks. Prices may be quoted at from $20.50 to $21.50 at tide for No. 1 Foundry, $19 for No. 2 and $17 @ $17.50 for Gray Forge, with a disposition to shade a trifle to good buyers. New brands are constantly putting in an appearance, and while the supply of good Iron is not excessive it is ample for all current requirements.

Foreign Iron.—There is nothing doing, and prices are purely nominal as last quoted, viz.: Bessemer, at about $20, c.i.f., duty paid; 20 % Spiegel, at $27.50 @ $28.

Blooms.—There is a fair demand for small lots of domestic Blooms, but nothing doing in foreign. Prices are about as follows for ordinary sized lots: Foreign, $30 @ $31 for Nail Slabs; $31.50 @ $32.50 for 4 x 4 Billets, and $35 @ $39 for Siemens-Martin, price according to analysis, &c. Domestic Blooms: Steel, from $30 to $35, f.o.b. cars at mill, according to analysis; Charcoal Blooms, $53 @ $54; Run-out Anthracite, $45 @ $46; Scrap Blooms, $38 @ $39 ₱ "bloom" ton.

Muck Bars.—There is a demand for first-class Bars, for which $30.50 at mill is asked, although buyers are reluctant about paying over $30. Some are offering Bars at $29.50, but either quality or delivery is unsatisfactory, so that very little headway is being made on that class of goods.

Bar Iron.—There is more demand for Bars, several large orders having been given out, and more likely to be at an early date. The demand for car-building purposes keeps up remarkably, and, judging from the orders recently given out, is likely to continue all summer. The Pennsylvania Railway Company have given out contracts for 2200 cars, and for 70 of the heaviest build of locomotives, in addition to the large number in process of construction in their own shops. Other roads are renewing their equipments in a similar way, so that the consumption of Bar Iron must be very heavy during the spring and summer months. At the same time, orders at mills have run so low that it will require weeks of good business to place them in such condition as they were in a year ago. The loss of the Skelp Iron trade seems to be felt more than anything, but there is some prospect yet of its picking up again, although at the moment there is absolutely no demand. Prices are not what they ought to be by any means, the close com-

petition from mills in the interior keeping quotations down to the most unremunerative figures, say about 1.9¢, delivered, for 1000-ton lots, although nominal rates are supposed to be 2¢ at mill. General quotations, however, are 1.9¢ @ 1.95¢, but better terms are granted on large and desirable specifications

Plate and Tank Iron.—There is more business offering, but without any improvement in prices. Some of the mills are so short of orders that they have named unusually low prices on certain specifications, but it is pretty hard to get business on terms that will allow even a small margin to manufacturers. But there is an impression that things are near to a turning point and that a full supply of orders will soon be available, if not somewhat better prices. Asking rates are about as follows: Ordinary Plate, 2.10¢ to 2.15¢; Tank, 2.15¢ @ 2.20¢; Shell, 2.5¢ @ 2.6¢; Flange, 3.5¢; Fire-Box, 4¢; Steel Plates, Tank and Ship Plate, 2.4¢ @ 2.5¢; Shell, 2.8¢; Flange, 3¢ @ 3¼¢; Fire-Box, 3¼¢ @ 4¼¢.

Structural Iron.—Nothing heavy has been done of late, but leading mills are running moderately full, on old contracts. A considerable amount of new business is in sight, and it is likely that the full capacity will be required to meet the demand during the spring and summer months. Prices steady and unchanged, as follows: 2.15¢ @ 2.25¢ for Bridge Plate; 2.25¢ @ 2.35¢ for Angles; 2.8¢ @ 2.9¢ for Tees, and 3.3¢ for Beams and Channels, Iron or Steel.

Sheet Iron.—There is a fair demand, and mills have not had much chance of accumulating stock so far. Prices are steady, and for the best makes are quoted about as follows:

Best Refined, Nos. 24, 27 and 28	3½¢
Best Refined, Nos. 18 to 25	3¼¢
Common, ¼¢ less than the above	
Best Bloom Sheets, Nos. 26 to 28	4½ @ 4¾¢
Best Bloom Sheets, Nos. 22 to 25	4 @ 4¼¢
Best Bloom Sheets, Nos. 16 to 21	3¾ @ 3¾¢
Blue Annealed	2.8 @ 3 ¢
Best Bloom, Galvanized, discount	60 %
Common, discount	65 %

Steel Rails.—There is no special movement to notice at present, although there is a fair average demand, but only for moderate sized lots. Manufacturers are expecting a larger business in the near future, and are holding prices with absolute firmness at $31.50, at mill, for the most desirable class of orders, and from that to $32.50 for smaller lots. Steel in other forms is in pretty good demand, so that mills are kept moderately busy on their various specialties.

Railway Supplies.—There is not much demand at present, and prices are barely steady at 2.15¢ @ 2.25¢ for Spikes, 1.9¢ @ 2¢ for Fish Plates and 3¢ @ 3.10¢ for Track Bolts.

Old Rails.—Interest in this commodity seems to have died out again. One or two good sized lots of T's were sold at a shade over $22, Philadelphia, but there are free offerings to-day at $22, without meeting with any indications of a desire to buy. The available supply, as regards spot lots, is not large, but with so little demand the market is weak and irregular.

Wrought-Iron Pipe.—There is no improvement in the general situation. Orders are scarce and prices continue very unsatisfactory. Discounts are quoted as follows: Black Butt-Welded 50 %; on Galvanized do., 42½ %; on Black Lap-Welded, 62½ %; on Galvanized do., 50 %; Boiler Tubes, 57½ %.

Scrap Iron.—The demand has fallen off considerably, and the supply is now slightly in excess of current requirements. Quotations are nominally unchanged, but show less firmness, and for large lots could doubtless be shaded a little. No. 1 Scrap, $21 @ $21.50; carload lots, $22 @ $22.50, or for choice lots $22.50 @ $23; No. 2 do., $14 @ $15; Turnings, $15 @ 16; Old Car-Wheels, $17.50 @ $18; Old Steel Rails, $20 @ 21; Cast Scrap, $16 @ 17; do. Borings, $11 @ $12; Old Fish Plates, $26 @ $27; Old Car-Wheels, from $18 to $19, delivered.

Nails.—Trade moves slowly, as usual at this season of the year, although a fair amount of orders are entered for spring delivery. Prices show a hardening tendency at from $2.10 to $2.15 ℔ keg from store. The committee at work on the projected pool report progress.

Pittsburgh.

Office of *The Iron Age*, 77 Fourth avenue, PITTSBURGH, PA., February 21, 1888.

Pig Iron.—The market here continues in an unsettled and unsatisfactory condition; demand is for small lots, consumers buying only as their immediate necessities require, while prices to furnacemen are unremunerative and irregular. In the present condition of the market it is very generally admitted that there is no margin for the furnacemen, but they are hopeful of getting cost of production reduced or a better price for their products; as there is not much prospect of the latter, the former is for the time their only alternative—it is either that or blow out, as some have done already. Efforts are being made to secure cheaper Coke, Ore, Limestone, &c., as well as labor, which there is reason to believe will sooner or later be rewarded with success. At the present time, however, the market is in an exceedingly unsatisfactory condition, as, in addition to a very limited demand, prices obtainable do not, under the most favorable circumstances, more than cover actual cost of production. It is true stocks in the hands of consumers are very light, and just as soon as orders for products commence to come forward at all freely they will want to replenish their stock of raw material. As compared with those of a week ago prices remain unchanged. We quote as follows:

Neutral Gray Forge	$16.50 @ $17.00,	4 mos.
All Ore Forge	17.50 @ 18.00	"
White and Mottled	15.50 @ 16.00	"
No. 1 Foundry	18.50 @ 19.00	"
No. 2 Foundry	17.50 @ 18.00	"
No. 3 Foundry	16.50 @ 17.00	"
No. 1 All-Ore Foundry	19.50 @ 19.75	"
Charcoal Foundry	22.00 @ 25.00	"
Cold Blast Charcoal	27.00 @ 30.00	"
Bessemer Ir n	18.00 @ 18.50	"

Rumors prevail of Bessemer having been sold at $17.50, cash, but so far as we can learn there have been no actual sales under $17.75, cash, and we do not believe that a standard brand can be had below that figure.

Muck Bar.—The market continues dull, but there has been no change in prices, which we quote at $27.75 @ $28, cash. There have been no sales of good quality under $28, cash, and some makers want $28.50 and will not sell for less.

Manufactured Iron.—There has been but little change in the situation during the week under review, but the indications are that business will improve within the next week or two. Manufacturers are dissatisfied with the present, but hopeful of the future. Prices remain about as last quoted. Bars 1.80¢ to 1.85¢@1.90¢; Plates, 2.35¢ @ 2.40¢, No. 24 Sheet, 2.85¢ @ 2.90¢, all 60 days, 2 % off for cash. It is worthy of mention that car builders are, as they have been for a year past, buying freely, and there is not much doubt but what other large consumers will be on the market before long.

Nails.—There is more inquiry, but no improvement in price, which to makers is unsatisfactory, being unremunerative, but until the demand improves considerably it is not likely that there will be any effort made to put up prices, which we continue to quote in carloads and upward at $1.90, 60 days, 2 % off for cash. It is understood that the Wheeling manufacturers do not feel very kindly toward their brethren of Pittsburgh, claiming, as they do, that the latter have taken undue liberty with the Western Nail Association, which is supposed to have its headquarters at Wheeling. The Pittsburgh men some time ago dropped the card from $2.25 to $2 without consulting Wheeling, but manufacturers at the latter point were not slow to follow suit, as did all the manufacturers in the Ohio Valley. The Pittsburghers thought there was no sense in keeping the card at $2.25 when the actual selling price was $2, with the usual rebate of 10¢ ℔ keg on carload lots and upward.

Wrought-Iron Pipe.—There is no change to note in this important and growing department of the Iron business. Dullness is still the order of the day, and no substantial improvement is looked for until the latter part of next month. Indeed, the Pipe trade is always light from January until April. Prices remain unchanged as follows: Discounts on Black Butt-Welded Pipe, 50 %; on Galvanized do., 42½ %; on Black Lap-Welded, 62½ %; on Galvanized do., 50 %; Boiler Tubes, 57½ % off; Casing, all sizes, 55 % off; 2-inch Tubing, 13¢ per foot, net; 2-inch Line Pipe, 12¢, net.

Old Rails.—There have been additional sales of American Tees, 1300 tons reported, all at $24, cash, which is from 50¢ to $1 ℔ ton less than foreign Tees can be laid down here at from the seaboard. There have been no sales of foreign Tees reported for several weeks, and for the time they are knocked out of this market, as consumers will not pay more for them than they can buy American Rails at. We can report a sale of 500 tons foreign Double Heads at $25.50. It is worthy of mention that American Rails are offering a good deal more freely than was expected, and there appears to be more of them than people have any idea of. There is not much use in holders of foreign Rails attempting to boom the market as long as consumers can buy all the American at from 50¢ to $1 ℔ ton less.

Steel Rails.—Heavy sections are still quoted at $31.50, cash, on cars in Pittsburgh.

Billets, &c.—There has been increased activity in Bessemer Billets the last week, and as the mills are all well sold up the markets are firmer; we report sales of some 3500 tons at $29.50 @ $30; we are cognizant of an order for 2000 tons having been declined at $29, cash, deliverable at mill of seller, and we hear of one firm having orders booked for 6000 tons In view of this it is strange that reports get to New York of sales having been made here at $28.50 @ $28.75. Nail Slabs are also in demand and firmer, with sales at $29.25 @ $29.50. Domestic Crop Ends quotable at $18.75, and do. Bloom Ends at about 50¢ ℔ ton less. Foreign Rail Crops are practically out of this market, on account of the low price of domestic. We can report a sale of foreign Billets bought for a special purpose at $33.50, cash, delivered in Pittsburgh.

Railway Track Supplies.—An improved trade is looked for within the next week or two, as in some sections of the country the work of railway construction can soon be commenced. Spikes, 2.60¢, 30 days, delivered; Splice-Bars, 1.90¢ @ 2¢; Track Bolts are lower, 2.95¢ with square and 3.05¢ with hexagon nuts.

Old Material.—Sales of No. 1 Railroad Scrap at $20, net ton; Wrought Turnings at $13 @ $14; Car Axles, $26 @ $27; Cast Borings, $12 @ $13 gross; Cast Scrap, $16.50 @ $17; Locomotive Tires, $20.50.

There appears to be no demand whatever in this market for Old Car Wheels; no sales reported for a considerable time, and it is impossible to give reliable quotations.

Chicago.

Office of *The Iron Age*, 95 and 97 Washington St., } CHICAGO, February 20, 1888. }

Increased business is reported in many branches of the Iron trade. The probability of an early termination of the freight war is having some effect in stimulating buyers to place orders for such stock as they believe they will need within a reasonable time, but in some lines, notably Hardware, the increased trade is largely due to the legitimate demand and the small stocks carried by retail dealers. In Steel Rails the heavier movement now reported is a direct result of the long delay by the railroad companies in placing their orders.

Pig Iron.—Sellers report a fair trade in small lots, with a decided increase in inquiries, and negotiations in progress for considerable quantities. The market has latterly been in such condition, especially for Coke Irons, that quotations have been rather uncertain, and the increased inquiries, instead of establishing a degree of firmness, have had the effect of actually lowering prices. Cheap Irons continue to be in greatest demand, as Scrap is very scarce and is even dearer than Pig. Furnace companies claim that they have now reduced prices to the lowest point possible, discounting all the saving in cost, which they expect to effect from cheaper Ore, Coke and freights, and their representatives assert that if prices are forced any lower there will be a general blowing out. The consumption of Pig Iron is so great, however, and consumers' stocks are known to be so low that it is believed a change must soon take place, when buyers will seek the sellers. At present the sellers are overwhelming a buyer if he is known to be in the market for a few carloads. Lake Superior Charcoal is not in the same condition as Coke Iron, being well sold up, and with a fair prospect of the entire production of the year being needed to supply the demand for it for special purposes. Still the weakness in Coke Iron will naturally cause Charcoal Iron to sympathize if it continues. Cash quotations for small quantities are as follows, f.o.b. Chicago: Lake Superior Charcoal, all numbers, $21.50 @ $22; Alabama Car-Wheel, $26; Southern Charcoal Foundry, $20.50 @ $21.50; Jackson County Softeners, No. 1, $20.50; Hocking Valley, Soft Foundry, No. 1, $20 @ $20.50; American Scotch, No. 1, $20.50 @ $21.50; Lake Superior Coke, all Ore, No. 1, $19.50 @ $20; No. 2, $18.50 @ $19; No. 3, $17.50; Cinder Mixed, 50¢ less; Coke Bessemer, run of furnace, $20; Southern Coke, No. 2, $19 @ $19.50; No. 2½, and Open Bright, $18.50 @ $19; No. 3, $18; No. 1 Mill, $17.50; No. 2 Mill, $17.25.

Bar Iron.—An increased number of small orders were in the market, and one sale of 1000 tons of Car Iron was made. On large lots prices are probably as low as they have been, but carload orders are being held at 1.60¢ at mill in the Mahoning Valley, half extras, as bottom for Common Iron, with 15¢ per 100 lb. advance asked for Guaranteed Muck Bar. Other mills are meeting this rate, with some asking up to 2¢, f.o.b. Chicago, for All-Muck Bar Store prices are still 2¢ @ 2.2¢, according to quality, with concessions to best buyers.

Structural Iron.—More business is reported in consequence of the advance in the season, but their is no special feature to note. Mill orders, f.o.b. Chicago, are quoted as follows: Angles, 2.55¢ @ 2.60¢; Tees, 2.90¢; Universal Plates, 2.50¢ @ 2.60¢; Beams and Channels, 3.4¢. Store prices are $\frac{3}{10}$¢ @ ½¢ higher than these rates. Bridge orders for Angles and Tees can be placed at 15¢ ℔ 100 lb lower.

Plates.—A fair trade is in progress, both from mill and from store. Store prices are as follows: Heavy Sheets, Nos. 10 to 14, 2.70¢; Tank Iron, 2.70¢; Tank Steel, 3¢; Shell Iron, 3¢; Shell Steel, 3¾¢; Flange, 4¢; Fire-Box, 4.75¢. No change is reported in Boiler Tubes, which are still weak at 55 % @ 57½ % off.

Sheet Iron.— Manufacturers' agents sell an occasional carload, but the market is very quiet. The few mill orders taken are generally at about 3¢ @ 3.05¢, Chicago, for No. 27. Jobbers' prices a little weaker, and No. 27 is now sold in small lots at 3.45¢, with the usual concessions for quantity.

Galvanized Iron.—The demand is strong and prices are very firm. The demand comes from various sources, a great deal being bought by railroad companies with some call from roofers and the manufacturing trades generally. The price for small lots is still 60 % off for Juniata, and 60 % and 5 % for Charcoal.

Merchant Steel.—The railroad companies have been liberal buyers recently, but the general trade has been rather quiet, although purchases from store are increasing from week to week. Quotations are as follows: Bessemer Bars, 2.5¢; Tool Steel, 8½¢ @ 9½¢; Specials, 13¢ @ 25¢; Crucible Spring, 4.25¢; Open-Hearth Spring, 2.9¢; Open-Hearth Machinery, 2.75¢ @ 3¢; Crucible Sheet Steel, 7¢ @ 11¢.

Steel Rails.—Orders aggregating upward of 30,000 tons have been taken by the local manufacturers during the past week, and the prospects are now very favorable for their securing at an early day the entire quantity allotted to them. Light Rails are in continued good demand. Heavy Sections are quoted at $34 @ $35, at mill.

Old Rails and Wheels. — Several transactions in Old Iron Rails are reported at various prices. One lot was sold for $21, another at $21.25, another at $21.75, and the largest at $22, all Chicago delivery or its equivalent. Old Steel Rails have been freely sold at $18, free from Frogs, &c. A sale of Old Car-Wheels at $21.60 is reported, but offers of Wheels by other parties at $21.50 have not resulted in business.

Scrap.—A continued inquiry is reported, but actual sales during the week have been few. Dealers are offering $14 @ $15 for Mixed Country Scrap. Selling quotations for carefully selected are as follows, ℔ ton of 2000 lb: Railroad Shop or No. 1 Forge, $21 @ $22; Track, $19 @ $20; No. 1 Mill Iron, $16 @ $17; Light Wrought, $9.50 @ $10.50; Machinery Cast, $16 @ $16.50; Stove Plate, $12.50 @ $13; Cast Borings, $10; Wrought Turnings, $12 @ $12.50; Axle Turnings, $14.25 @ $14.50; Coil Steel, $15; Leaf Steel, $16 @ $16.50; Locomotive Tires, $17 @ $17.50; Horseshoes, $20; Axles, $26 @ $26.50.

General Hardware.—Manufacturers' agents are enjoying a heavy trade, which is fully up to that of last year, while the jobbing houses are doing even better than last year at this time. The very pleasant spring-like weather of the past 10 days has had much to do with this, giving promise of an early resumption of general outdoor work. The demand runs heavily on seasonable goods, as might be expected, but there is a very fair general business being done, no classes of goods being neglected. Prices show but little change. The advance in Nuts has now been accepted by all dealers, but Bolts are still weak and need a little heroic treatment, except Carriage Bolts, which are firmly held. The large stocks of Screws held here have been pretty well closed out, and purchases are being made at the fixed rates. Collections are very good, except in sections in which the crops were light last year.

Nails. — Manufacturers' agents report trade quiet, but the jobbers are doing a heavy business, some of them being hardly able to get Nails fast enough to fill their orders. Steel Cut Nails are now being sold by jobbers at $2.05, f.o.b. Chicago, in carloads; $2.10 in mixed cars, and $2.20 in small lots. The price of Wire Nails is $2.70 for carloads and $2.80 for small lots. Both manufacturers' agents and jobbers are having a good demand for the latter, but manufacturers' prices are no higher than they have been, while important concessions are now being made on extras.

Barb Wire.—A very good trade is reported by manufacturers and jobbers. The former have greatly reduced their stocks of Barb Wire made in advance of the season, while some of them are even behind in filling their orders. They are now reaping the benefit of their refusal last fall to sell large quantities for future delivery. Jobbers' quotations for Painted are 3.10¢ for carloads, 3.15¢ for mixed cars and 3.20¢ for small lots, with the usual ¼¢ advance for Galvanized.

Pig Lead.—Speculative interests have been active, some 1200 tons having been taken on private terms for future delivery, almost every lot offered having been quietly absorbed. The market is reported strong at 4.85¢ @ 4.90¢ for carloads.

Chamberlain, Wheeler & Co., of Columbus, Ohio, represented in Chicago by John E. Cartwright, 58 Dearborn street, have been appointed agents for the sale of Raney & Berger's Norway Pig Iron, which is manufactured at Newcastle, Pa. They will have control of the markets west of Ohio.

Cincinnati.

Office of *The Iron Age*, Fourth and Main Sts., } CINCINNATI, February 20, 1888. }

Pig Iron.—The market for Pig Iron in this vicinity is drifting and variable. The transactions recorded are of small amounts, but in the aggregate the volume of business is fair. There are various forces at work which work interchangeably and modify the general market, so that the future is clear to neither buyers nor sellers. Producers draw comfort from the fact that the consumption of Iron is large, with no evidence of any decline, while at the same time statistics show that there has been a material falling off in the production since last November, the period of greatest production. Prices are low, and for the Northern furnaces there is but little margin of profit, but the drop in the price of Lake Superior Ore, of Hanging Rock native Ore and of Coke relieves them materially and gives them a better opportunity to fight off the alternative of blowing out or banking up which many of them contemplate, and a number of these have already suited the action to the word. Buyers, however, regard the situation with supine inaction, not being pressed, or seeing no necessity for placing orders ahead; but it is now reported that a number of Southern furnaces which have taken orders for round amounts at $20.50, $19 and $18 are unable to deliver, and buyers are becoming restless, which state may lead to the cancellation of these contracts and the placing of the same with other furnaces. There is less Southern Iron coming North now than last year, for while the production in the South has in-

creased about 5 %, the increase in home consumption has been proportionately more. Prices current here have not changed essentially recently.

Old Rails and Wheels.—There has been a moderate demand for Old Wheels, but Old Rails have remained dull, without change in prices of moment. Old Rails are quotable at $21.50 @ $22, but Old Wheels are saleable at $20.50 @ $20.75 ℔ ton and held higher.

Manufactured Iron.—There has continued to be a moderate volume of business in Manufactured Bar, Sheet, Structural Iron and a steady market.

Nails.—The market has remained quiet and easy, but prices have been well sustained.

Cleveland.

CLEVELAND, February 20, 1888.

Iron Ore.—During the past week reports have reached the Ore men in Cleveland that 40,000 tons of Steel Rails have been sold in the East at $31.50—equivalent to $33 here. But, although Ore men have insisted all along that they were waiting for just such transactions between the railroads and the manufacturers, the market seems wholly unaffected thereby. For years the selling season for Ore had opened somewhere between January 15th and February 1st, but there seems little likelihood of any sales this year for two or three weeks. Buyers are slightly encouraged regarding the outlook by the reports of the Coke manufacturers. The latter claim that their whole output for 1888 has been sold at present quotations. This means $2 from the foundrymen; $1.85 from dealers, and $1.75 from the furnaces. It is generally believed by Ore dealers and furnacemen that the output of Ore for 1888 will fall from 500,000 to 1,000,000 tons below that of 1887. This feeling is not, however, universal. Many enthusiastic Iron men promise a revival in the Pig-Iron market and a cut in the vessel rates before March 15. If their hopes are realized the demand will in all probability be heavy. At present, however, the mine owners, furnacemen and dealers generally can only guess at the outcome. Certain it is that not a pound of Ore has been sold for midsummer delivery. Some of the surplus Ore on the docks is being sold at the following quotations: No 1 Specular and Magnetic Bessemer Ore ℔ ton, $6.50 & $7; same in non-Bessemer, $6 @ $6.50; Bessemer Hematites, $5.75 @ $6.50; non-Bessemer Hematites, $5 @ $5.50; Gogebic Ore, $5.50 @ $6.

Old Rails and Wheels.—No sales of Old Rails are reported, and the demand is evidently weak. A few lots of Old Wheels have been sold at $20.50 @ $21.

Pig Iron.—Excessive dullness characterizes the market. The furnaces are busy, but their product is stacked, and the only excuse for their operation is to work up their stock of Ore and keep their men at work. The dullness is attributed to the low quotations reported from Pittsburgh. When substantial orders from the railroads begin to come in a rise in Pig Iron quotations is assured. It is said that 700 tons of No. 1 Mill Iron were sold last week at $16.50, f.o.b. cars Cleveland, four months. This report only serves to substantiate the generally expressed belief that ready cash could buy Pig Iron at quotations not heard of before since the last pronounced depression in the market. There is still a demand for all grades of Lake Superior Charcoal, but it is limited, and prices have dropped to $21 @ $22.50. Other Irons are quoted to-day at these figures: No. 1 Bessemer, $19.35 @ $19.85; No. 1 Foundry, all Lake Ores, $19.35 @ $19.85; No. 2 Foundry, all Lake Ores, $18.35 @ $18.85; No. 1 Silvery, Ohio Ores, $19 @ $19.50; No. 1, Gray Forge, Red Short, $18.35 @ $18.85; No. 1 American Scotch, Blackband, $18.85 @ $19.35.

Chattanooga.

Office of *The Iron Age*, Carter and Ninth Sts., CHATTANOOGA, TENN., February 20, 1888.

Pig Iron.—The condition of the market remains about the same as our last report—quiet, conservative, yet firm. There are no accumulations of stock, excepting, perhaps, a few off grades and lots of inferior quality, which evidently shows that the demand is about equal to the supply, so far as the Southern districts are concerned. Quite a number of stacks are out being relined, which, of course, is curtailing the output somewhat. The old Etna Furnace, of Polk County, Ga., is fixing up to start again. Its product will be Cold Blast Charcoal. The Elliott Iron Works (old Round Mountain) will be in a condition to blow in again about April 1st. Its product will also be Cold Blast Charcoal.

Detroit.

CHARLES HIMROD & CO., dealers in Iron, Detroit, Mich., report, under date of February 20, 1888, as follows: We judge from the reports of other markets that there is a decided dullness in the Pig-Iron business. This does not extend, however, to Lake Superior Charcoal, as the market here has been unusually active, several thousand tons of Charcoal being placed here last week, and there are also considerable dealings in Foundry Iron for consumption here. Prices on Foundry grades, however, were off to a considerable extent. Lake Superior Charcoal we should report as strong and active, and with small stocks in the hands of makers, while the general Foundry trade is weak, but not particularly dull in this market. Dealings in Old Material have also been seen to a considerable extent, particularly in Old Wheels.

We quote the market to-day as follows:

Lake Superior Charcoal, all numbers	$22.00 @ $23.00
Lake Superior Coke, All Ore	21.25 @ 21.75
Lake Superior Coke, Cinder Mixed	19.00 @ 20.00
Standard Ohio Blackband	21.50 @ 22.00
Southern No. 2	19.50 @ 20.00
Southern Silvery	18.50 @ 19.00
Jackson County, Ohio, Silvery	20.50 @ 21.00
American Old Iron Rails	25.00 @ 26.00
Old Wheels	21.50 @ 22.00

Coal Market.

The resumption of mining in the Schuylkill region is general and entire with rare exceptions, in compliance with a vote by the miners convened in Pottsville last Sunday. On Tuesday the Reading had 26 collieries in operation, while 10 were undergoing repairs. Six only were idle on account of refusal to resume, as ordered by Master Workman Lewis. All were practically full-handed and, in any event, would be able to produce all the Coal demanded in the present state of the market. A number of applicants for work were refused employment, principally engineers who refused to hoist coal for non-union men. The Reading company claim that there is no discrimination; that they simply refuse to discharge one man to make room for another. Nevertheless, there is a possibility of renewed trouble to-day if the miners become exasperated. At the New York Coal agencies the changed appearance of affairs is viewed with undisguised satisfaction, but they can promise no immediate change in prices, and for the moment stagnation is supreme. Coal will begin to arrive both at Elizabethport and Port Richmond by the close of this week. Quotations are as before—viz., Free Burning White Ash Stove, $5, alongside; Chestnut, $4.75, f.o.b. Stove and Nut are plenty at $5; Broken and Egg, $4.40 @ $4.50. The scarcity of steam sizes has not been relieved.

The constantly increasing Coal supply from the Wyoming region, in volume almost sufficient to compensate losses elsewhere, is the most striking anomaly of the situation, and affords convincing proof of the great excess of the possible aggregate production, compared with the demand. For the week ending February 18 the total receipts were 628,575 tons, derived from the following sources: Wyoming, 539,982 tons; Lehigh, 57,593; Schuylkill, 35,000 tons. Since January 1 the total is 3,949,137, as compared with 4,135,274 for the same time in 1887. The weekly gain during the last five weeks appears from the following:

	Tons.
Week ending January 21	555,517
Week ending January 28	447,464
Week ending February 4	568,767
Week ending February 11	570,077
Week ending February 18	628,575

The loss in Anthracite production by the Reading Company was about 750,000 tons during January and this month to the 18th inst.

The Lehigh officers in this city thus far have received no intimations that work is about to be resumed either at Coxe Brothers or the Packer collieries. It is understood that the return of the men on the old basis would be welcomed.

The balance sheet of the Delaware, Lackawanna and Western Railroad shows cash on hand $1,084,082. The total surplus amounts to $12,815,966. The company transported 8,363,343 tons of Coal during the year.

The report of the Lehigh Coal and Navigation Company shows a surplus for the past year of $512,069, with $98,000 charged for depreciation on coal improvements and $61,594 added to the sinking fund. The Coal tonnage transported was 5,148,224 tons. Bituminous Coal is unchanged, and it is understood the more conservative members of the Seaboard Association recommend that $2.60, the present price, be allowed to rule during the season opening March 1. Shipments from the Cumberland region last week were 53,289 tons.

Metal Market.

Copper.—On Thursday of last week London opened with Chili Bars at £78. 7/6, with sales of 475 tons, our own market being flat and easier, sales on 'Change not exceeding 225,000 lb at 16.40¢ @ 16.45¢ for March delivery, and 16.50¢ for June. On Friday London receded 2/6, being cabled £78. 5/, the market here weakening still, but leading to a fair turnover of some 450,000 lb at 16.20¢ @ 16.25¢ for March, 16.50¢ for April, 16.35¢ for May, and 16.35¢ for June. During the week mining shares were fairly active in London, Rio Tinto, Mason & Barry and Tharsis improving 1½ each, while in Paris, after some fluctuations, Rio Tinto advanced 7½ francs. The January output of mineral of six of the seven leading Lake companies, according to the Boston *Transcript*, compares as follows:

	1888. Tons.	1887. Tons.	1886. Tons.
Calumet and Hecla	1,802	2,694	2,563
Tamarack	625	300	174
Atlantic	229	202	200
Osceola	210	158	165
Franklin	177	202	204
Huron	110	104	127
Total	3,153	3,660	3,433

The domestic export of Ingot Copper last year has been 12,347,507 lb, as compared with 19,504,087 lb in 1886. London again opened lower Monday, £78, with sales of 550 tons, our own market following suit with a decline of 5 to 10 points, 100,000 lb selling at 16.35¢ @ 16.45¢ for April, and 16.30¢ for May. On Tuesday the market here was more active and lower, sales aggregating 1,000,000 lb, chiefly April, at 16.30¢ @ 16.35¢; March

at 16.15¢, and June 16.25¢. The market closes with spot Lake at 16.15¢, March 16.10¢, April 16.35¢, May 16.40¢ and June 16.30¢, London closing at £78 for Chili Bars. During the week Boston dispatches have positively asserted that the Calumet and Hecla Company have sold their product for three years—150,000,000 lb—to the syndicate at 13¢ ₱ lb. At the agency in this city this report is not confirmed, it being stated that thus far no orders have been received to indicate a change in the present method of selling current product to manufacturers. The trade here seems, however, to be leaning to the conviction that some arrangement has been perfected, and movements in the Boston stock market appear to confirm it. The effect of such a sale would be to eliminate the greatest factor among producers in opposition to the syndicate's plans and methods in this country, and would seem to hold out for a considerable time to come a continuance of the present unduly high price for the metal. It offers, too, to all interested in idle Copper mines of fair prospects a powerful argument to induce the investment of capital. It will probably lead to an early wild speculation in this class of property the world over, with excellent opportunities to promoters and early investers to make a turn. It is argued that the syndicate may count largely on the enormous consumption which a European war might create.

Tin.—A fair amount of business has been done, March Tin advancing from 34.85¢ to 36¢, with 35.90¢ bid and 36.10¢ asked at the close on Tuesday. February was done on Monday at 36.45¢, with 36.50¢ bid and 36.80¢ asked at the close, while the range on April is 33¢ @ 33.20¢, the total sales being over 300 tons. London has fluctuated little, closing Tuesday at £166 for spot and £143 for futures. *Tin Plates.*—The condition of the Tin-Plate market at this writing is so nearly akin to what it was a week ago that the briefest of reports will suffice. The trade in Cokes continues large, though somewhat lighter than it has been recently. Prices are in consequence a little easier, but not quotably lower. Stocks here are reported scarce and very much broken. There is no trade doing in Ternes, which though not plentiful are in fair supply. The foreign market is steady and quiet. We repeat last week's quotations for large lots in New York as follows: Siemens-Martin Steel, Charcoal finish, $5.10 @ $5.30, ditto, Coke finish, $4.90 @ $5; Ternes, $4.20 @ $4.30; Bessemer Coke, $4.75 @ $4.80, and Wasters, $4.62½.

Lead.—The leading operator is reported to have bought 1200 tons of Richmond Lead at 5¢, and is operating through others on the bull side at the Exchange where some business has been done, the latest transactions being small lots of April Lead at 5.10¢ @ 5.15¢. In the aggregate, the holdings of the operator in question are stated to be large. The trade generally appears to have little confidence in the movement, which, it is surmised, may be connected with efforts to be made to throw obstacles in the way of the present large importations of Lead, free of duty, in silver ores from Mexico.

Spelter.—The market is quiet and weaker at 5.30¢ for American Domestic. It is being influenced by efforts attributed to a large Western works to depress the market for Ore by low offerings of Spelter, 5¢ at works being the figures quoted. *Sheet Zinc* remains 5¾¢ in round lots here.

New York Metal Exchange.

The following sales are reported:

THURSDAY, February 16.

50,000 lb Copper, March	16.45¢
25,000 lb Copper, March	16.50¢
16 tons Spelter, February	5.30¢
32 tons Lead, April	4.95¢
16 tons Lead, spot	4.96¢
75,000 lb Copper, March	16.40¢
50 tons Tin, May	31.50¢
25 tons Tin, May	31.60¢
15 tons Tin, May	31.65¢
10 tons Tin, May	31.75¢
20 tons Tin, March	34.85¢
10 tons Tin, March	34.95¢
10 tons Tin, March	35.05¢
10 tons Tin, April	33.10¢
50,000 lb Copper, March	16.40¢
25,000 lb Copper, June	16.50¢
16 tons Lead, May	5.00¢
16 tons Lead, May	5.02½¢
112 tons Lead, May	5.05¢
50 tons Lead, May	5.07½¢
20 tons Tin, February	36.75¢

FRIDAY, February 17.

80,000 lb Copper, April	16.50¢
25,000 lb Copper, May	16.35¢
25,000 lb Copper, June	16.35¢
50,000 lb Copper, April	16.50¢
10 tons Tin, February	36.75¢
30 tons Tin, April	33.05¢
20 tons Tin, April	33.00¢
25,000 lb Copper, April	16.50¢
25,000 lb Copper, March	16 20¢
25,000 lb Copper, March	16 25¢
150,000 lb Copper, April	16.50¢
25,000 lb Copper, June	16 35¢
50 tons Lead, April	5.07½¢
50,000 lb Copper, April	16.50¢
32 tons Lead, spot	4.95¢

SATURDAY, February 18.

20 tons Tin, April	33.00¢

MONDAY, February 20.

25,000 lb Copper, April	16.45¢
50,000 lb Copper, May	16.30¢
10 tons Tin, March	36.00¢
20 tons Tin, February	36.45¢
10 tons Tin, March	36.00¢
20 tons Tin, May	31.80¢
32 tons Spelter, March	5.30¢
16 tons Spelter, April	5.27½¢
30 tons Tin, March	36.00¢
25,000 lb Copper, April	16.35¢

TUESDAY, February 21.

25,000 lb Copper, June	16.25¢
25,000 lb Copper, April	16.30¢
25,000 lb Copper, March	16.15¢
750,000 lb Copper, April	16 30¢
50,000 lb Copper, June	16.25¢
100,000 lb Copper, April	16.35¢
25,000 lb Copper, June	16.25¢
16 tons Lead, April	5.10¢
16 tons Lead, April	5.15¢

Imports.

The imports of Iron and Steel, Hardware, &c., at this port from February 13 to February 18, inclusive, and from January 1 to February 18, inclusive, were as follows:

	Feb. 13 to Feb. 18. Tons.	Jan. 1 to Feb. 18. Tons.
Iron Ore: A. Earnshaw	1,120	1,778
Chas L. Wright & Co	500	500
Pig Iron: G. W. Stetson & Co	550	2,500
Crocker Bros	300	1,500
N. S. Bartlett	100	1,200
R. Crooks & Co	100	600
Spiegeleisen: J. A. Jansen	1,020	5,352
Dana & Co	50	50
Crocker Bros	21	144
Steel: R. F. Downing & Co	18	34
J. Abbott & Co	16	267
Newton & S	14	34
R. H Wolff & Co	12	91
Cary & Moen	11	32
M. Cohn	10	42
Chas. Hugill	6	50
Muller S. & Co	5	5
W. F. Wagner	4	181
C. W. Power	3	3
Lalance & G. Mfg. Company	2	25
A. Milne & Co	1	936
Steel Rods: Hy. Whittemore & Co	1,000	1,000
J. Abbott & Co	450	1,431
Naylor & Co	307	1,869
Dana & Co	300	305
R. H. Wolff & Co	135	624
A. Heyn	201	401
J. A Roebling's Sons	18	248
Cary & Moen	15	192
C. A. Walschid	5	5
Steel Billets: J. Abbott & Co	50	100
Steel Sheets: Pierson & Co	15	172
W. H Wallace & Co	5	5
C. S. Mersick & Co	5	5
Steel Forgings: Thos. Prosser & Son	170	714
Steel Tubes: A. R. Whitney & Co	3	3
R. H. Wolff & Co	2	2
Steel Hoops: A. R. Whitney & Co	235	880
Bullock & W	250	250
Steel Scrap: A. Milne & Co	50	50
Rivet Rods: Muller S. & Co	25	100
Wire Rods: Pierson & Co	10	10
Sheet Iron: T. B. Coddington & Co	30	254
Nail Rods: A. Milne & Co	51	51
Screw Wire Rods: American Screw Co	150	232
Iron Girders: W. H Wallace & Co	97	174
Ferromanganese: C. L. Perkins	1,000	1,000

Tin Plates.

	Boxes.	Boxes.
Pratt Mfg. Co	13,529	26,974
Phelps, Dodge & Co	10,690	56,861
A. A. Thomsen & Co	5,387	27,001
Dickerson, Van Duzen & Co	5,111	44,664
T. B. Coddington & Co	3,158	22,258
Lombard, A & Co	3,000	3,000
H. Whittemore	2,398	4 744
Bruce & Cook	2,328	10,676
R. Crooks & Co	1,322	11,703
N. L Cort & Co	1,159	15,809
Naylor & Co	645	14,779
Wolff & Reesing	500	900
C. S. Mersick & Co	220	1,506
Peter Wright & Sons	133	133

Metals.

	Pounds.	Pounds.
Tin: J. Doval & Son	21,334	21,334
American Metal Company	11,385	232,880
Naylor & Co	11,321	281,017
Hendricks Bros	11,214	124,596
Nickel: McCoy & Sanders	5,680	25,680
	Casks.	Casks.
Antimony: American Metal Co	50	50

Hardware, Machinery, &c.

Boker, Hermann & Co., Arms, cs., 18; Mdse., cs., 18
Castle, G. A & Co., Hdw., cs., 7
Field, Alfred & Co., Mdse., cs., 14; Chains, cks., 21
Gaisford, H. J., Chains, bols., 2
Graef Cutlery Co., Cutlery, cs, 9; do., cks., 23; Hdw. cs., 2
Gurney, F. B., Mdse, cse., 1
Hartley & Graham, Mdse., cs., 5
Kastor, A., Mdse., cs., 8
Marcia Co., Mchy., cs., 4
Pim, Forwood & Co., Mchy., pgs., 19
Rosenthal, J. & Co., Hdw., cs., 13
Schoverling, A., Mdse., cs., 18
Schoverling, Daly & Gales Mdse., cs., 25
Springer Torsion Balance Co., cask, 1
Sutro Bros., Mchy., cs., 3
Wiebusch & Hilger, Lim., Anvils, 182
Witte John G. & Bro., Needles, case, 1; Cutlery, cs., 4; Hdw., case, 1; Guns, cs., 6
Wood, R. D., Mchy., case, 1
Order: Mach'y, pgs., 27; Nails, cks., 38

Irons and Metals Warehoused from February 13 to February 18, inclusive.

	Tons.
Spiegeleisen: Naylor & Co	586
Steel Rods: Naylor & Co	750
Old Iron Rails: Henderson Bros	250

Exports of Metals.

	Feb. 13 to Feb. 18. Pounds.	Jan. 1 to Feb. 18. Pounds.
Copper: J. Abbott & Co	51,880	2,906,257
Lewisohn Bros	487,860	1,045 960
American Metal Company	45,920	1,270,12
G. H. Nichols		111,116
J. Bruce Ismay		112,000
F. A Lomal		2,481,000
S. Mendel	224.000	560,000
Ledoux & Co		2,10
Phelps, Dodge & Co		230 664
Muller, Schall & Co		225,000
Copper Queen Con. M. Co		224,034
J. Kennedy, Tod & Co		112 026
H. Becker & Co		1,250
Orford C. & S. Rfg. Co		224,881
Robt. M. Thompson		125,000
Thos. J. Pope, Sons & Co		115,000
J. Parsons & Co	67,500	67,500
Copper Matte: Williams & Terhune	3,172,825	12,531,658

Paints, Oils and Sundries.

Black, Lamp—Coach Painters' ₱ lb @ 24¢
" Ordinary 6¢
Black, Ivory Drop, fair 12 @ 15¢
" " best 23¢
Black Paint, in oil, kegs, 8¢; assorted cans, 11¢
Blue, Prussian, fair to best 40 @ 55¢
" " in oil 45 @ 55¢
" Chinese dry 70¢
" Ultramarine 18 @ 30¢
Brown, Spanish 1¼¢
" Van Dyke 10 @ 12¢
Dryers, Patent American, ass'd cans, 9¢; kegs, 7¢
Green, Chrome 15 @ 23¢
Green, Chrome in oil 14 @ 18 @ 25¢
Green, Paris good, 20¢; best, 25¢
Green, Paris in oil good, 30¢; best, 35¢
Iron and Bright Red ₱ lb 2¼¢
Iron Paint, Brown ₱ lb 1¼¢
Iron Paint, Purple ₱ lb 3¢
Iron Paint, Ground in oil, Bright Red ₱ lb 6¼¢
Iron Paint, Ground in oil, Red ₱ lb 5¼¢
Iron Paint, Ground in oil, Brown ₱ lb 5¼¢
Iron Paint, Ground, Purple ₱ lb 6¢
Litharge 6½¢
Mineral Paints 2 @ 4¢
Orange Mineral 10¢
Red Lead, American 6½¢
Red Venetian (Eng.) dry $1.65 @ $1.70
Red Venetian in oil ass't'd cans, 11¢; kegs, 8¢
Red Indian Dry 9 @ 12¢
Rose Pink 10 @ 13¢
Sienna, American Raw, powdered 4¢
Sienna, Burnt, powdered 4½¢
Sienna, Burnt, in oil 10 @ 16 @ 20¢
Sienna, Raw 11 @ 15 @ 25¢
Umber, Burnt, powdered 4 @ 8¢
Umber, Burnt, in oil 9 @ 12 @ 15¢
Umber, Raw, powdered 4 @ 7½¢
Umber, Raw, in oil 9 @ 12 @ 15¢
Vermillion, Chinese 90¢
Vermillion, English 70 @ 71¢
Vermillion, American Common 15¢
White Lead, American pure dry 6¢
White Lead, American pure dry, in oil 7 @ 7½¢
White Paris, English Prime 2 @ 2½¢
Yellow Ocher, French $1.75
Yellow Ocher, French, in oil ass't'd cans, 11¢; kegs, 8¢

Yellow Ocher, Vermont	in casks, 1½¢
Yellow Chrome	17 @ 27¢
Yellow Chrome, in oil	14 @ 18 @ 25¢
Zinc White, American No. 1, dry	5 @ 6¢
Zinc White, American No. 1, in oil	9¢
Zinc White, French (Paris Dry)	6¾ @ 7¾¢
Zinc White, French, in oil	10 @ 11¢

Sundries.

Asphaltum, Cuban, ₩ lb.	5½ @ 6½¢
Asphaltum, Egyptian	8 @ 9½¢
Benzine, 62°, ₩ gal	8½ @ 9½¢
Coal Tar	₩ bbl., $3 00 and $4 00
Chalk, ₩ 100 lb	45¢
Chalk, Block	3¢
Crucibles No 14 and upward, ₩ number	3½¢
Grain Emery, 300 lb kegs	4 @ 4½¢
Flour Emery, finest quality	2½ @ 2¾¢
Glue, White	18 @ 35¢
Glue, Sheet	13 @ 20¢
Glaziers' Points, Zinc, ₩ box	$4.75
Gum, Copal	30¢
Gum, Damar	25¢
Gum, Shellac, English	30¢
Gum, Shellac, English, dark	25¢
Mineral Wool, ordinary, ₩ lb	1 @ 1¼¢
Mineral Wool, extra	3 @ 3½¢
Naphtha, 70°	9 @ 10¢
Naphtha 76°	9½ @ 10½¢
Pumice Stone, selected lumps	3 @ 6¢
Pumice Stone, powdered	2 @ 2½¢
Pine Tar, bbls	$2.10 @ $2.12½
Pitch	$1.40
Plumbago, E. I. Po., ₩ lb	4 @ 6¢
Plumbago, American, ₩ lb	6 @ 10¢
Plumbago, Gun Powder Glazing, ₩ lb	10¢
Plumbago, Shot Polish, ₩ lb	10¢
Putty, in bladders	2½¢
Putty, in bulk	1¾ @ 2¢
Rosin, Strained and Good	$1.37½ @ $1.40
Rosin, E. & F.	$1.42½ @ $1.47½
Rosin, G. & H.	$1.55 @ $1.62½
Rosin, I & K	$1.75 @ $1.85
Rosin, M. & N.	$2 00 @ $2.25
Spirits Turpentine, ₩ bbl	41 @ 44¢
Stove Polish, Dixon's	₩ gross, $6 00
Stove Polish, Rising Sun	5.50
Stove Polish, Gem	4.50
Stove Polish, Jet Black	3.50
Waste, No. 1 Cop	8¾¢
Waste, No. 1 White Machine	8¾¢
Waste, No. 2 White Machine	8¼¢
Waste, No. 1 Colored	6¼¢
Waste, No. 2 Colored	5¾¢
Waste, Washed Machine	8½¢
Whiting, Spanish, ₩ 100 lb	50¢

Oils.

Bleached Whale, ₩ gal	44¢
Bleached Sperm, ₩ gal	67½ @ 75¢
Fish Oil, Pressed	28
Lard, Prime, present make	63½ @ 65¢
Cylinder Oil	70¢
Machinery	45¢
Engine	35¢
Linseed, Raw, in casks and bbls	56 @ 59¢
Linseed, Boiled, in casks and bbls	60 @ 63¢
Neatsfoot	70 @ 80¢
Cotton Seed, Refined	41 @ 44¢

Old Metals, Rags, &c.

The purchasing prices offered by dealers are as follows:

Heavy Copper	₩ lb	$0.10 @	$0.12
Light Copper	₩ lb,	@	.09
Copper Bottoms	₩ lb,	@	.09
Brass, Heavy	₩ lb,	@	.08½
Brass, Light	₩ lb,	@	.06½
Composition	₩ lb,	.0,12 @	.12
Lead, Heavy	₩ lb,	.03¾ @	.04½
Tea Lead	₩ lb,	@	.04
Zinc	₩ lb,	.03 @	.03¼
Wrought Iron	₩ ton,	18.00 @	
Light Iron	₩ ton	10.00 @	
Stove Plate Iron	₩ ton,	10.00 @	
Machinery Iron	₩ ton,	13.00 @	13.50
Grate Bars	₩ ton	@	7.00
Old Rubber	₩ lb,	.04½ @	.05½
White No. 1	₩ lb,	.03⅝ @	.03¾
White No. 2	₩ lb,	.01¾ @	.01¾
Canvas, Linen, No. 1	₩ lb,	.04 @	.04½
Canvas, Cotton, No. 1	₩ lb,	.04⅜ @	.04½
Canvas, No. 2	₩ lb,	.02¾ @	.02½
Seconds	₩ lb,	.01 @	.01½
Soft Woolens	₩ lb,	.06½ @	.07
Mixed Rags	₩ lb,	.01 @	.01⅛
Gunny Bagging, No. 1	₩ lb,	.02½ @	.02¾
Jute Butts	₩ lb,	.02¼ @	.02⅜
Book Stock	₩ lb,	.01 @	.01⅛
Newspapers	₩ lb,	.00¾ @	.01
Waste Paper	₩ lb,	.00¾ @	.00½
Hemp Twine	₩ lb,	.02½ @	.03
Sisil Baling Rope	₩ lb,	@	.03

Specifications have been issued by the city authorities of Chicago for five engines, together with suitable pumps and the necessary boilers, all to be fully equipped for service in connection with the Chicago Water Works. One engine and three boilers are to be located on the city lot on Harrison street, known as the Central Station, to be completed and in running order by March 31, 1889, and four engines with twelve or more boilers are to be located on Fourteenth street, near Indiana avenue, to be in running order by March 31, 1890. Proposals will be received only for vertical triple expansion engines with steam-jacketed cylinders, having the pumps directly connected with the steam piston rods, and having single-acting outside packed plungers, except that quadruple expansion engines may be offered, and engines having less than 5 feet stroke will not be as favorably considered as those having longer stroke. The engines shall be exactly alike in form and proportion. Each engine with not more than two-thirds the boiler capacity furnished must have sufficient power and capacity to raise from the inlet well directly into the pipe system of the city not less than 15,000,000 gallons of water in 24 hours, under a head equivalent to 125 feet above the surface of water in the well. The engines must be so constructed as to operate independent of one another, each performing a due proportion of the work. The duty required is not less than 100,000,000 pounds of water raised one foot high for each 100 pounds of coal consumed in the furnace of the boilers, for a period of not less than 48 hours. In the performance of this duty the steam pressure must not exceed 125 pounds per square inch. Bids will also be considered with a higher boiler pressure, the bidders to specify the duty they guarantee. Bids will be received until March 31st.

Fuel Gas at Pittsburgh.

For more than a year past Mr. George Westinghouse, Jr., assisted by some of the most skilled gas and engineering experts in the country, has been endeavoring to solve the problem of manufacturing fuel gas, and after months of labor and the expenditure of thousands of dollars the announcement is made that their efforts have been crowned with success, and that fuel gas can be manufactured from coal for 2 cents a thousand feet. At the commencement of the experiments the Fuel Gas and Electric Engineering Company, Limited, was formed and a plant was erected on the South Side in which to make the experiments, and on Friday, the 17th inst., a public exhibition of the fuel gas they are making was given. The process of manufacture employed is claimed to be very simple. The coal or illuminating gas is first driven out of the coal; part of the coke which is a product of this part of the process is then used either alone or with raw coal to produce generator gas, which is much of the same character as ordinary producer gas, but of a much higher efficiency. The remaining part of the coke from the first part of the process is utilized in the generation of hydrogen and several other of the constituents of ordinary water gas. The gaseous products which result from these different parts of the process are then mixed, forming the ultimate product of the process in its entirety. The mechanical appliances employed, although new and elaborate in design, are so simple in operation that a plant capable of manufacturing 1,000,000 cubic feet of gas every 24 hours can be operated by three men and a boy, with alternate shifts of 12 hours each. The low cost at which the gas can be manufactured renders it a substantial rival to natural gas, and will be of immense advantage to Pittsburgh as well as other cities. Should the supply of natural gas fail at any time, the fuel gas can be manufactured at prices as low as the natural gas, on account of Pittsburgh being situated in the best gas coal region in the United States. The gas is now being introduced from the South Side plant into the glass works of Atterbury & Co., while a specially constructed furnace is being put up at the pipe works of A. M. Byers & Co., about one-half mile distant. The gas will be conveyed in pipes of the same material as those used to conduct natural gas. The company are now obtaining coal from different localities, to see which will best answer the purpose. Any kind of coal or even coal dust can be used, but these experiments are being made for the benefit of the plant which will probably be erected at Chicago. An analysis of this gas gives the following results:

	First sample. Per cent.	Second sample. Per cent.
Carbonic acid	4.60	3 00
Olefiant oxide	.60	0.80
Carbonic oxide	26.20	28.60
Hydrogen	46.00	42.00
Marsh gas	7.40	6.80
Nitrogen	15.20	18.80
Total	100.00	100.00

At the corner of Twenty-Fifth and Liberty streets the company recently erected an establishment for the manufacture of appliances used in gas manufacture, and which employs about 75 men.

A $100,000 damage suit has been entered in the circuit clerk's office, at St. Louis, by the Freeman Wire Company against the Washburn & Moen Mfg. Company, of Worcester, Mass., and Isaac L. Ellwood, of De Kalb, Ill. This suit is not based on infringement of patent, but is on an alleged damaging circular letter sent throughout the country by the defendants, containing language derogatory to the character and wares of the plaintiffs. The petition states that the Washburn & Moen Mfg. Company published circulars and distributed them publicly, in which it was said that the Freeman Wire Company were infringing on certain letters patent held by them and that the firm were insolvent. The petition further states that the plaintiffs had large business interests in Missouri, Kansas, Nebraska, Colorado, Illinois and other States, which have been seriously impaired by letters sent through the States by the agents of the Washburn & Moen Mfg. Company. The plaintiffs also filed with the petition various letters of a threatening character issued from the law offices by the Washburn & Moen Mfg. Company's attorneys and agents. It also refers to different times that one J. W. Millington, a duly authorized agent of defendants, called upon merchants in the cities of Salisbury and California, Mo.—namely, Wm. S. Coleman and Richard Keily—and did maliciously, and with intent, it is believed, to destroy the business of the Freeman Wire Company by declaring them insolvent, and saying that they would make promises which they never carried out. By such action and words on the part of said Millington, the said plaintiffs in this cause were deprived of a large amount of trade. The petition goes on to state that plaintiffs, by such actions on these different counts, have been damaged to the amount of $100,000, for which they ask judgment, with costs and interest.

The Union Steel Company, of Chicago, have nearly completed their preparations and expect to put their steel works and rail mill into operation about the 15th of March. This makes a stoppage of over three months for them. The Joliet Steel Company will probably start up later in the same month. They will then have been closed about the same length of time.

The lack of capital in Mexico and the remedy for this embarrassment to industrial enterprise are remarked upon by the Mexican *Financier*: "The reason why we have got into the habit here of looking to foreign countries for capital is because there is no systematic gathering up of the slow accretions of capital by means of savings banks, and also because there is little mutual confidence which leads men, as in Chili, Peru and the Argentine Republic, to organize companies to undertake new businesses.

General Hardware.

The market presents few new features, the demand continuing fair, without material increase. The changes in price are unimportant, the general tone of the market being firm.

BARB WIRE.

On the 14th and 15th inst., at St. Louis, was held the largest and most important meeting of Barb-Wire manufacturers that has occurred for years. It was the culmination of the contest between the owners of the Barb-Wire patents and their licensees which has been in progress since the promulgation of the decision of Judge Shiras, at Dubuque. A strong effort was made by some of the manufacturers to induce the Washburn & Moen Mfg. Company and I. L. Ellwood, the owners of the patents, to change the form of their contracts, so as to permit them to manufacture the Glidden Barb if they desired to do so, as each contract specifically states the form of the Barb for which a license is granted. This was resisted by the owners of the patents, and finally an agreement was reached that the royalty should be reduced to 5 cents per 100 pounds for all the Barb Wire produced during the six months beginning with the first of January, but that no change whatever was to be made in the contracts. At the end of the six months it is hoped that the skies will be clearer, and that the course of action for the future shall then be more plainly defined. The meeting is reported to have been very harmonious, the desirability of cordial co-operation having been appreciated by all. The meeting considered no other question than the status of the patents, hence no action was taken regarding the price of Barb Wire. The following attended the meeting: C. G. Washburn, I. L. Ellwood and Mr. Glidden, the inventor, and George S. Douglas, of New York; R. E. Sears, Marshalltown, Iowa; H. A. Noble, Des Moines, Iowa; John W. Lambert, Mr. Ashley and C. J. Kraft, Joliet; Geo. T. Oliver, Pittsburgh; M. Converse, Cleveland; A. Henley, Lawrence, Kan.; James Larmon, Cincinnati; L. L. Smith, Johnstown, Pa.; H. B. Scutt, H. H. Schreffler and J. R. Ashley, Joliet; H. C. Cragin, representing the Washburn & Moen interest at Chicago; Mr. Gregg, Crawfordsville, Ind., and N. O. Nelson, representing the American Barbed Wire Company, and John W. Gates, William Edenborn and Alfred Clifford, representing the St. Louis Wire Mill Company.

Our Chicago correspondent writes: "The Barb Wire manufacturers are realizing the benefit of their policy of last fall, when they declined to sell large quantities of Wire for future delivery. The demand is now far in excess of what it was a year ago, when the opposite policy was being carried out. Some of the largest manufacturers not only have no stock in their warehouses, but are from two to four weeks behind their orders. The consequence is that prices have some foundation, and although they are not high enough to indicate a 'boom,' they are sufficiently high for a very healthy state of trade, with a reasonable prospect of thus continuing through the spring. The lesson learned should not be forgotten, while there are some other branches of business which would do well to heed it. Whenever possible, the manufacturer should control the trade in his product."

NAILS.

Very satisfactory progress was made at the meeting held last week of the Eastern Nail manufacturers. The association formed has been widely heralded in the press as a Nail Trust, and erroneous details have been printed. So far as it is possible to furnish particulars concerning the arrangement, in addition to the general outline given in our last issue, the plan proposed is as follows: The Nail manufacturers east of the Allegheny Mountains are asked to, and a good many of them have already agreed to, accept an allotment. Every mill pledges itself not to make more Nails than it has been allowed under the arrangement, the object being to prevent overproduction and attendant demoralization. The quantity allowed every mill has been decided upon, on the basis of past production and present equipment, substantially as outlined in the plan brought forward last fall. The only material change agreed upon is that the Upper Susquehanna Mills have been given a lump allotment, which they may distribute among themselves. The adjustment of differences and the carrying out of the details lies with a board of control. For the present the aggregate allotment is 2,000,000 kegs, which, of course, is below the requirements, which in 1887 were 2,664,920 kegs, and in 1886 3,172,583 kegs. At some future time the allotment will be increased as the demand calls for it. The association as such does not undertake in any way to fix prices. That will continue to be the province of the Atlantic States Nail Association, consisting nearly of the same parties. Whether or not the dictates of the latter will have any more influence upon market values than the little they have had in the past few years remains to be seen. Returning to the arrangement now under way, it may be stated that any mill has the right to sell its allotment to any other member, and it is possible that in this manner some of the works may possibly stop their machines, and devote the rest of their plant to the production of other specialties. The daily press has announced that the mills have each undertaken to deposit $5000 as a guarantee of good faith. This sum is far above the true figure. As proposed, mills having less than 50 machines put a sum of money considerably smaller than that named. Those having more than 50 machines add to it a given amount per machine, in addition thereto, until a certain maximum is reached. This sum is forfeited when a mill exceeds its allotment, but on renewed payment of a like sum the mill may again become a member providing the assent of three-quarters of the other members be given. Such in a general way is the plan proposed. As already stated, it has been agreed to by quite a number of the mills. The president of the association, who is not directly identified with any one mill, and a special committee appointed, is now visiting those who have not yet signed, and the prospect that the plan will be carried through is regarded as bright.

The New York market is moderately active and steady, with sellers generally asking $2.10 from store for Iron Nails, and carloads at $2.

MISCELLANEOUS PRICES.

Owing to the continued high prices of Copper and Tin, the Phosphor Bronze Smelting Company, Philadelphia, under date of February 20, withdrew all prices and discounts heretofore quoted on their Phosphor Bronze manufactured goods. They state that they have been enabled to continue former prices to their customers up to this time by reason of heavy purchases of materials immediately prior to the recent advance, and state that they now ask their friends to bear only a portion of the actual increased cost due to the prices they are now obliged to pay.

The condition of the Steel Goods market is referred to as satisfactory, most of the manufacturers having secured the usual number of orders for the coming season. The Executive Committee of the Fork and Hoe Makers' Union held a meeting in Buffalo, N. Y., on the 16th inst., to consider, among other questions, the subject of an advance in the price of the goods. After carefully reviewing the situation the decision reached is expressed in the following resolution, which was unanimously adopted:

Resolved, The price on Steel Goods shall be continued exactly as established by the union.

In printing the discount sheet of Sargent & Co., in our issue of February 9, an error occurred, No. 20 Broad Fast Joint Butts being put at discount 65 per cent. instead of 55 per cent. The trade will please note the correction.

The price of Copper is having its effect on a good many goods in which an advance is formally announced, causing a withdrawal of the lowest quotations, and the naming of slightly advanced prices in some cases.

Wire Nails are without material change, beyond the fact that there is a disposition to make a small advance on the extreme prices at which some large sales were lately made.

There is a slight improvement in the Chisel market, some of the manufacturers withdrawing their extreme quotations, and naming figures slightly in advance of those recently prevailing.

ITEMS.

The friends of H. Knickerbacker, Ballston Spa, N. Y., who is widely known throughout the trade as the manufacturer of Blood's Axes, &c., will regret to learn of his bereavement on Monday of last week in the sudden death of his son, Henry Knickerbacker, Jr. It occurred through the accidental discharge of a pistol, the bullet of which entered the brain and caused almost instant death. The young man had just attained his majority, having graduated last year from the Troy Polytechnic Institute and was entering upon a career of exceptionally bright promise. In this great and sudden sorrow Mr. Knickerbacker will have the deep sympathy of the trade.

The trade throughout the country will regret to learn of the death of William E. Lawrence, president of the Lawrence Curry-Comb Company, 204 East Forty-third street, New York. Mr. Lawrence died January 29, in the 64th year of his age, having been ill for a comparatively brief time, and having been previously actively engaged in business. He is well known as the founder of the Lawrence Curry-Comb Company, which was established about 15 years ago, and had a wide acquaintance among the trade throughout the country. Mr. Lawrence's death will not cause any interruption or change in the business of the company of which he was the head, his sons, who were associated with him, continuing the business as before. John D. Lawrence has been chosen president and secretary, and W. C. Lawrence, treasurer. For some time the company have been preparing for the enlargement of their line of goods, adding to their manufactures a complete line of Curry Combs, in addition to their Perfect Curry Combs, which are a specialty of their manufacture. The preparations for putting these additional goods on the market are nearly completed, and for their manufacture the company, in the near future, will have increased facilities. John H. Graham & Co. continue as agents for the sale of the goods.

The Goulds Mfg. Company, Seneca Falls, N. Y., have issued a convenient pamphlet and partial price-list of Engines, Pumps and Hydraulic Machinery, which is intended for use by the jobbers. It is made of convenient size for inclosing in letters of quotation, thus saving the annoyance

and delay incident to mailing catalogues under separate cover. This list, which represents only the company's most staple goods, is a pamphlet of 40 pages, illustrated, with list prices and descriptive matter. It is admirably adapted for the purpose which it is designed.

Henry Disston & Sons, Philadelphia, Pa., are issuing a handbook for lumbermen which is deserving of special attention, on account of its completeness and merit. It is a treatise on the construction of Saws, with instructions how to keep them in order. It is divided into two parts, the first being devoted to the construction and general management of Saws, concerning which a great deal of valuable and interesting information is given, with accompanying illustrations relating to the running and repairing of Saws, &c. The second part is occupied principally with instructions and illustrations in regard to Saw filing, which is fully explained with a description of approved methods. In their introductory remarks referring to the advance that has been made in the manufacture of Saws, the company say:

In 1840, when Henry Disston commenced the manufacture of Saws, the lumber business, which has since assumed such vast proportions, was in its infancy. It had not been brought to the science it has since attained; Saws were not required to stand the tremendous speed and feed which is now demanded of them; lumber was plenty, and the thickness of the Saw was not a serious question; since then mills have been introduced that drive the Saw at a tremendous speed, and the feed has been increased proportionately, consequently Saws must be made to stand this increased demand upon them.

They then refer to the quality of their Saws and the efforts they make to secure the highest perfection, and add the fact that notwithstanding this care and attention on their part they are compelled at times to suffer from a want of experience on the part of the men engaged in the mill business, who persist in running a Saw beyond the limit of endurance, while some of them use improper methods to keep their Saws in order. It is with a view to giving information to the users of Saws which will enable them to use Saws judiciously that this pamphlet of nearly 100 pages is published. It cannot fail to be of service to many sawyers.

E. H. Richardson, Waltham, Mass., issues a circular relating to the Granite State Lawn Mower, manufactured by Newhall & Stebbins, Hinsdale, N. H., for whom he is agent, and also Shedd's Patent Blind Fasteners, Blind Hinges and Sash Weights. In regard to the Sash Fasts Mr. Richardson advises us that he is making up a large amount, and will be in a condition to fill orders promptly the coming season.

The trade will observe the auction notice on page 47, in which Haydock & Bissell announce a trade sale of Hardware and House-Furnishing Goods, February 29 and March 1 and 2. The sale will comprise a large assortment of Shelf Hardware and Edge Tools and other leading Hardware Goods, together with 600 cases of Tacks and Nails of the Thayer & Judd Pff. Company, and House-Furnishing Goods, of which the particulars are given in the advertisement.

Silver & Co., 56 Warren street, New York, advise us that in their suit against Geo. E. Lockwood to sustain the validity of their Egg Beater patent of November 3, 1885, decision was rendered in their favor, adjudging that their title to said patent is good, and ordering a permanent injunction against the defendant.

The Kansas City Hardware Company, Kansas City, Mo., have issued an illustrated spring catalogue of seasonable goods. It relates to Barb Wire, Refrigerators, Lawn Mowers, Screen Doors, Water Coolers and Freezers, Curry-Combs, Pruning tools, Bird-Cages, Wheel-Barrows, &c. The first page contains a list of the houses for whom the company are agents.

James Beggs & Co., 9 Dey street, New York, issue a convenient pamphlet showing the line of Machinery, Tools and Supplies for blacksmiths and carriage and wagon makers, of which they are manufacturers or dealers. It shows a variety of Forges, Blowers, Tuyere Irons, Upsetters, Benders, Vises, Bolt Cutters, Hollow Augers, Hand Hammers and Drilling Machines.

Thomas Laughlin & Son, Portland, Me., issue on a card a series of office rules, which are pointed and suggestive.

The trade will observe the advertisement on page 84 in which E. Plimpton & Sons, Litchfield, Me., illustrate their Patent Tooth and Socket Hoe, concerning the special features of which information is also given.

Goulds & Austin, Chicago, Ill., issue a circular devoted to Hose Reels, Lawn Sprinklers, &c., in which different patterns of Hose Reels are illustrated, with reference also to Rubber and Fabric Hose.

It is announced that Rothery, Davis & Co., Philadelphia, have established a general exporting house, through whom it is intimated that the manufacturers, especially of that State, can have ready access to foreign markets.

The trade will observe the announcement on page 84 in which the Ridgway Refrigerator Mfg. Company, 815 Arch street, Philadelphia, and 8 Lafayette Place, New York, call attention to their line of Refrigerators and Ice Chests. Their catalogue illustrates the varied assortment of these goods, with full explanation of the principles on which they are constructed The company mention that their prices range from $2 upward.

Paine, Diehl & Co., Philadelphia, issue a circular relating to their Press and Strainer, made under the Spencer patent. They allude especially to the excellence of the manufacture of these goods and to the weight of the material, as well as their adaptation for the purpose for which they are designed.

The Geuder & Paeschke Mfg. Company, Milwaukee, Wis., have issued their spring catalogue. It represents their line of Fisher Refrigerators, Ice Chests, Vapor and Oil Stoves, Vapor and Oil Stove Trimmings, Cans, &c., Water Coolers, Freezers, Clothes Wringers, Creamery Goods and Bird Cages.

Scheeler & Sons, proprietors of the Buffalo Wire Works, Buffalo, N. Y., in their catalogue No. 2, 1888, which they have just issued, describe their varied line of Wire Cloth, Wire Goods, &c. The different kinds and meshes of Wire Cloth are prominently referred to, some of the meshes made by them being very neatly and satisfactorily represented on page 5. Their Fire-proof Wire lathing is also shown, together with their Netting, Fencing, Screens, Sieves, and a large variety of Wire Goods.

The White Mountain Freezer Company, Nashua, N. H., have issued their catalogue and price list for the coming season. They refer to the demand for the White Mountain Freezer as having greatly increased in the past five years, and allude to its mechanical construction, simplicity of operation, durability and especially the excellence of its production. Their catalogue contains illustrations of their different Freezers, with unusually full descriptions. Sand's Hand or Power and Family Ice Crushers are also illustrated. They report the outlook for business as gratifying, and state that up to the present writing their orders exceed those of any previou year by 40 per cent. This increase comes largely from the West.

George N. Pierce & Co., Buffalo, N. Y., have issued their 1888 catalogue. It represents their line of Japanned and Brass Bird Cages, Refrigerators, Ice Chests, Tricycles, &c., of which copious illustrations are given. We make the following extract from their introductory circular to the trade:

We are pleased to announce to our friends that we are again occupying our own buildings. Having had the misfortune to lose them, together with all our stock and machinery, late in the fall of 1886, we were greatly retarded in our ability to take care of our customers for the spring trade of 1887, but we have rebuilt our factory and placed the most improved kinds of machinery in position for doing with ease double the amount of business that we have ever before been able to take care of. We can promise faithfully to give the best goods that can be made, and prompt shipments in filling orders. We have never made as complete an assortment of Japanned and Brass Bird Cages or as fine a line of Refrigerators as we offer for this year's trade. We have labored a year to perfect our new Tricycles, and can now say that all the defects in the old machine have been overcome, and our new Tricycles will take the place that they are entitled to—the very head of this class of goods.

A press dispatch from Belleville, Ill., dated the 18th inst., states that the Western Nail Company on that day confessed judgment for $50,000 in favor of the First National Bank and the Belleville Savings Bank. The plant of the company is estimated to be worth $200,000, but owing to a depression in the market, in consequence of which the mill was unable to run without loss, it has been shut down for several months. The company were promptly paying interest and waiting a favorable turn in the market to resume operations. The failure was precipitated by a claim of $15,000 in favor of the Continental Bank of St. Louis. The plant is a comparatively new one, having been started in September, 1882. Clapp-Griffiths steel works were added in 85-86.

Miller Lock Company, Philadelphia, are calling attention to important improvements recently introduced into their Keyless Champion Locks, and state that with a view to meet the increased demand they are preparing for the coming season a stock fully twice as large as that sold by them in 1887.

The Woolley & Moore Company, 89 Reade street, New York, have found it necessary to increase their storeroom, and in making several changes in their store the passageway to Chambers street has been unavoidably closed, and hereafter they will have an entrance at 89 Reade street only. They express their appreciation of the support given in their enterprise, and allude to their increased stock and improved facilities.

In the calamity suffered by Mount Vernon, Ill., through the visitation of a cyclone, on the 19th inst., the firm of R. L. Stratton & Co. are among the sufferers, their Hardware store having had its second story and roof blown away.

On the afternoon of the 18th inst. a conference was held at the Tremont House, Chicago, between the Milwaukee and Chicago Hardware jobbers. A number of business matters were discussed, and the relations existing between the wholesale interests of the two cities were placed on a somewhat better basis than that which had previously existed. As the same territory is reached by the jobbers of both cities, it had been found that there was an occasional conflict. The intention of the meeting was to secure a better understanding in regard to trade matters, to cultivate

a closer acquaintance with one another, and to clear up some points on which information was desired by both parties. The meeting was entirely harmonious, and the hope is expressed that in the future the jobbers of both cities will act in more complete accord with one another.

The Hardware store of Frederick Hoffman, Jr., at 6730 South Halsted street, Chicago, is reported to have been closed by the sheriff on the 18th inst., under a confession of judgment for $1057 in favor of the Wells & Nellegar Company.

ARRANGEMENT OF HARDWARE STORES.

We are indebted to C. T. Rosenthal, Batesville, Ark., for a description of his method of shelving, which is illustrated in the accompanying cuts, Fig. 191 showing the construction and numbering of the shelves, and Fig. 192 representing full

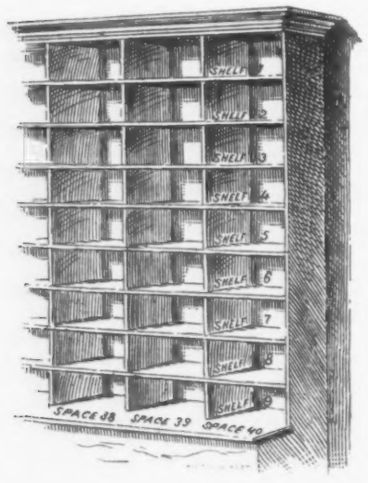


Fig. 191.—Method of Numbering Shelves.

size a card which is used to designate the location of duplicate stock. Mr. Rosenthal's description of his method is as follows:

I keep all goods that possibly can be so kept in wooden boxes on shelves, with sample in view attached. A good many articles are slow sale during a large part of the year, while during the other part of the year they are in daily demand. To illustrate: At one time 5 dozen Hungarian Nails is an ample stock, while four months later I keep 150 dozen on hand. I could not well, for want of space, have the boxes so large as to accommodate the full stock. Hence I have the boxes of moderate size and keep duplicate stock and drop a card, Fig. 192, in the box on the shelf. When the duplicate stock is sold the card is removed. My shelving is numbered as shown in Fig. 191. The space that is used for duplicate stock will be utilized according to the requirements of the season all the year round—and in fact with this system any odd place will be of use and the merchant can lay his hands on the goods at any time

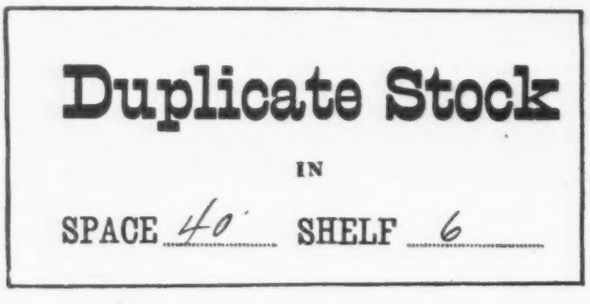


Fig. 192.—Duplicate Stock Card, Full Size.

The accompanying illustration, Fig. 193, represents a method of piling Wire, for which we are indebted to William Q. Wales, metal dealer, 26 Oliver street, Boston. It will be seen that the bundles of Wire are placed alternately on opposite sides of an upright stick, on the top of which the number of the gauge is marked. The stick, which may be about 5 feet long for accommodating 20 bundles, need

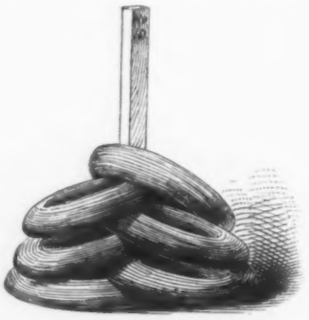


Fig. 193.—Method of Stacking Wire.

not be fastened to the floor or to a base of any kind, as three or four bundles will be sufficient to steady it. The advantages of this method are that one can see at a glance how many bundles of any number are in stock, while it also economizes space, and so holds the Wire that the pile is not liable to tip over.

REFERRED TO OUR READERS.

Hand Power Elevator.—A Missouri Hardware house advises us that they intend to built a store as early in the spring as the weather will permit, 20 x 90 feet, two stories and basement, the hight of the different floors being as follows: Basement, 8 feet; first floor, 14 feet, and second floor 11 feet. They would like to hear from the trade in regard to what they consider the best hand-power elevator suitable for such a building. They will build on a corner lot and have side entrance near the rear of the building to receive goods.

Sample Clasp.—A correspondent desires to be informed in regard to the best Sample Clasp for attaching samples to boxes in retail Hardware stores. One that is easily fastened on the box and will admit itself to the article held is desired. Our correspondent is using one which is referred to as getting loose and not holding the article.

Barrel and Hoop Iron.—A Hardware firm in New York State desire information as to the best way to keep Barrel and Hoop Iron. They state that they have seen several methods described, but none of them, in their judgment, are satisfactory.

Belting.—We still have inquiries in regard to the management of Belting, which can doubtless be answered satisfactorily if some in the trade will be kind enough to describe their method.

TRADE TOPICS.

In connection with the suggestion made by one of our correspondents in regard to the fact that the number as well as the weight of Tacks should be understood and announced, a Hardware merchant whose letter we published in our last issue calls attention to the diversity in the sizes of Tacks of different makes, inclosing samples of 8-ounce Carpet, some of which are very much heavier than others. The trade are aware that in this way the eager competition on Tacks is also working against the interest of the consumer, and merchants will do well to be on the lookout to see that they are getting Tacks that are not abnormally heavy. In order to meet this difficulty our correspondent suggests the following as the proper wording for labels:

100 TACKS,
¾ in.
HEAVY.
TINNED.

150 TACKS,
½ in.
LIGHT.
BLACK.

Referring to the correspondence in regard to Tacks and the manner of putting them up, we have the following from a Missouri Hardwareman:

Tacks and Nails have their value more in the number than in the weight. A pound of 10d Nails, which count the full standard, 60 Nails, is worth almost 10 per cent. more than a pound of 10d Nails which count only 55 Nails. Therefore, all controversy and trickery in the Tack business can be done away with by simply labeling each paper as follows: 250 8-ounce Tacks for Quarter Weight; 500 10-ounce Tacks for Half Weight, and 1000 16-ounce Tacks for Full Weight. If a manufacturer cuts the Tacks too heavy that is his own loss; the customer will look out that the Tacks are the right length. The most correct way of labeling the Tacks would be by number and measure, say, for 3-ounce it would read, 500 Tacks, ⅜-inch; for 4-ounce, 500 Tacks, 7-16-inch; for 8-ounce, 500 Tacks, 9-16 inch, &c. That method would be plain, easy to understand, and would avoid all trickery.

As referring to the difficulties in the way of changing the designation of Tacks and indicating the improbability of the adoption of a change, even though it might be theoretically desirable, we give the following extract from a letter which comes to us from one thoroughly familiar with the business, whose opinions are entitled to weight:

The discussion in your columns regarding the best method of packing and labeling Tacks is amusing to at least one of your readers who has had experience in the business. In theory it would be well to pack and label in the most convenient and simple manner, and in such a way that one buying Tacks for the first time would know the contents of the package in every particular—*i. e.*, length and quantity in both weight and count, &c., &c., but the present method is old as the oldest buyer, and, before an attempt is made to change it, let us wait until phonetic spelling, the metric system and a general simplification of things of greater importance is accomplished. At present no jobber would dare stock his shelves and warerooms with Tacks packed and labeled on a new system, and it would require a monopoly with the entire and absolute control of the Tack manufacturing business to accomplish such a

change, and then it would only be done after great confusion, discussion and trouble with the trade in general.

As many of the trade have expressed a desire for Tacks put up with explicit designation of their contents, the Auburn Tack Company, Auburn, N. Y., have decided to put up the goods in accordance with the plan of their Mr. Harris, as described in his letter published in our issue of January 26, which called out the discussion relating to this matter. They will put on each label a number which will correspond with the old designation by ounce, so that their Tacks will be No. 1, 1½, 2, 2½, 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 and 24. The packages will also specify the contents by weight. The company will begin with the following weights, which will be, as we understand it, named on each package: 2-ounce, 4-ounce, 8-ounce and 16-ounce or 1 pound. It is thought that for the carpet trade the 4 and 8-ounce packages will be the most popular. The trade will appreciate the readiness of the company thus to respond to the desire which has been expressed by a good many merchants for a line of Tacks which will state explicitly the quantity of goods contained in each package.

A correspondent, writing from Texas, refers as follows to the condition of business and the outlook:

Trade was good up to January 1. Since then there has been no trade amounting to anything on account of the bad weather, but the outlook in North Texas for 1888 is flattering, and we believe will be better that ever before since we have been in the business.

OUR EXPORTS TO ENGLAND.

The operation of the Merchandise Marks Act has a bearing upon American Hardware imported into England which demands the careful attention of our manufacturers, as goods are seized by the custom house in case they do not conform strictly with the requirements of the law. The London *Ironmonger*, in its issue of the 11th inst., makes the following statement with reference to seizures made under this act, from which it will be seen that several leading lines of American Hardware have been found to fail to conform with the terms of the statute; the point of complaint in most of these cases is, we presume, that the goods, while branded regularly as for the American market, fail to state the place of their manufacture:

Since Saturday a large quantity of goods, alleged to infringe the Trade-Mark Act, have been seized at Hull. Eighty consignments were seized in one day. The following tools and other American goods have been seized from the steamship Colorado: Axes marked "Champion steel blade," Saws marked "Cast steel," Lamps marked "Ironclad Lamp Stove," Steel Bits marked "Superior cast steel," Axeheads marked "Manufactured of best cast steel," Spirit-Levels marked "——— Rule and Level Company," Hay-Forks marked "——— Co., manufacturers of forks, &c.," Cooking Stoves marked "——— lamp stove," Scissors marked "Victoria cast-steel shears," Sash-Fasteners marked "Berlin-bronze fasteners," Hatchets marked "Champion steel hunter's axe," Hammers marked "Extra steel," Adze-Eye Axes marked "Scandinavian axes," Joiner's Squares marked "Try square." The importers of these American goods appealed to the Customs Commissioners on the ground that the Act is not infringed, because goods are marked in the language of the country in which they are produced. This justification will be most important if it is sustained, and the Act must be amended. This justifies the Cutlers' Company's contention that foreign goods should bear a mark showing the place of origin. The present Act only provides that goods shall not bear a British mark.

As a result of the operation of this statute, orders for American Hardware are coming in, with the stipulation that they be branded with the name of the place of their manufacture and the initials U. S. A., to mark them distinctly as of American production.

GOULDS & AUSTIN,

Chicago, Ill., in their special monthly discount sheet, bearing date February 12, give quotations on the varied line of goods represented in their catalogue. After naming some special net prices on Shovels and Spades, their quotations are as follows:

Hay Tools.	Discount.
Milwaukee Reversible Hay Carriers, subject to stock	$3.50
Harris Double Harpoon Forks, subject to stock	.85
Knot Pulleys, subject to stock	2.50
Maple Sheaves Pulleys, 5-in., $1.60; 6-in (doz)	$1.75, net
Hanger Hooks, 18-in., subject to stock, doz	.65 net
Hanger Hooks, 16-in., subject to stock, doz	.50, net
Rafter Iron Hooks, subject to stock, doz	.50, net
Mal. Rafter Irons, subject to stock, doz.	.50, net
Floor Hooks, subject to stock, doz	.65, net
Queen Cockle Mills	5.00, net
Austin 11-ft. Seeder	13.00, net
Cahoon Hand Seeder	3 25, each

Shellers.	
Tony Shellers, single, $5.25; with Fan	5.75
Feed Tables	35
Tony Shellers, single, with pulley	net 7.00
Hocking Valley Sheller, single, $5.25; with Fan	5.75
Tables	net .35
Hocking Valley Sheller, two-hole, complete, with fan and feed table	12.50
Hocking Valley Sheller, with Cob Carrier, complete	15.00
Tony Sheller, two-hole, complete, with fan and feed table	12.50
Burrall Iron Shellers	net 4.50
Horse Powers and Jacks, as per special circular only. (Catalogue list and description not correct.)	
4-Horse Powers, with two Levers, two Couplings, one Tumbling Rod	37.50
Jack for same, with 15-inch pulley	7.50
2-Horse Power, one Lever, two Couplings, 1 Tumbling Rod	24.00
Jack for same, with 15-inch pulley	7 50
1 Horse-power, 1 Lever, 2 Couplings, 1 Tumbling Rod	19.00
Jack for Same, with 15-inch pulley	6.00
Racine Farm Mills, 55 & 5 %; extras, 40 %; Warehouse, 35 & 5 %; extras	30 %
Racine Dustless Separators	30 %
Peckham's Furnaces and Caldrons	30 %

Feed Mills and Cutters.	
Clipper Feed Mills. See circulars.	
No. 1 Pulley Mill	net, $25.00
No. 2 Pulley Mill	net, 25.00
No. 3 Wind-Mill Grinder	net,
Anti-Friction Power	net, 15.00
Ross Feed Cutters, No. 17 and Smaller. See new circulars	40 %
Ross Giant Cutters	15 %
Ross Carriers	15 %
Lard Presses	40 & 10 %
Cider Mills, Senior, $15.50; Junior	$10.50

Wheel Barrows.	
Common Barrows, wood wheel, bent felloe, doz	net, 11.00
Climax Barrows, wood wheel, $15; iron wheel, doz	net, 17.00
Kilbourne & Jacobs's Bolted Barrow	net, 16.00
Kilbourne & Jacobs's Steel Wheels, per doz. extra	1.75
Perfect Bolted Barrows, doz	15.00
Daisy Garden Barrows, doz	22.00
Stone Barrows, B H, with Jacobs's patent wheel, Kilbourne & Jacobs, doz	net, 36.00
Steel Tray Stone Barrows each	net, 6.00
Wood Stave or Bark Barrows, $4; Brick Barrows, each	net, 6.00
K. & J. Mortar Barrows, doz	net, 25.00
Steel Tray Barrows, No. 1, $4.50; No. 2, each	net, 5.50
Tubular Barrows	40 %
Steel Tubular Barrows	45 %
Brick Hods $4; Mortar Hods, doz	$6.00
Barrel Carts, without bbl	3.00

Lawn Mowers.	
Buckeye Junior, 10 in., $4.25; 12 in., $5; 14 in., $5.75; 16 in	6.75
Buckeye Senior, 10 in., $4.25; 12 in., $5; 14 in., $5.75; 16 in	6.75
Globe, 10 in., $4.25; 12, in., $5; 14 in., $5.75; 16 in	6.75
18 in., Senior or Globe	7.25

Scrapers.	
Steel Bottom Scrapers, 30 in. $3.30; 32, in., $3.40; 34 in.	Net, 3 50
Slusser all Steel Scrapers, No. 1, $6; No. 2, $5; No. 3	4.50
Columbus Solid Steel Scraper, No. 1, $6.25; No. 2, $5.75; No. 3	5.25
Runners for Columbus Scrapers, extra.	Net, 50 cents per pair.
Chicago Scraper and Ditcher	25 %
Columbus New Wheel Scraper, pressed bowl, No. 2, $38; No. 3	$42.00
Columbus Little Giant Wheeler	27.00
Township or Breaking Plow, $14.00; Road or Grading Plow	net, 18.00
Austin Special Township Plow	12.00
Mammoth Railroad Plow	net, 45.00
Hand Carts	35 %
Warehouse and Store Truck, No 0 and 1, 55 and 5 %; 2 and 3	60&5 %
Wagon Trucks, 50 %; Railroad Trucks	60&10 %
Grain and Meat Wagons	50&10 %
Barrel Trucks, 60 %; Bag Trucks	net, $1 80
Malleable Tackle Blocks	50 %
Champion Forges, same list as Buffalo	50&5 %
Champion Blowers, same list as Buffalo	35 %

Governors, Steam Pumps, &c.	
Gardner Governor. New List	10 %
Duplex Steam Pumps	25 %
Royal Boiler Feeders	25 %
Centrifugal Pumps	35 %
Galvanized Pressure Pipe	45 %

Fittings.	
Cast Iron Elbows, Tees, Crosses, Reducers, Caps	65 %
Plugs and Bushings	70 %
Lock Nuts, Flange Unions, Return Bends, Y Bends	65 %
Branch Tees and Hook Plates	62½ %
Ceiling and Floor Plates	62½ %
Wrought Iron Couplings 65, Nipples	70&10 %
Malleable Unions	55 %
Malleable Fittings, pound list 10. Flanges	65 %
Malleable Fittings, Piece List	65 %

Iron Valves and Cocks.	
Globe and Angle Valves, Iron Body	62½ %
Cross, Check, Safety and Back Pressure Valves	62½ %
Butterfly Valves	62½ %
Iron Cocks	57½ %

Brass Valves.	
Brass Glove and Angle Valves	57½ %
Brass Globe and Angle Valves Jenkins' Disk	52½ %
Check and Cross Safety and Hose Valves	57½ %
Butterfly Valves	47½ %
Radiator Air Valves, Compression	60 %
Radiator Air Valves, Automatic, Davis	30 %

Brass Cocks.	
Steam Cocks	55 %
Service Cocks	55 %
Steam Cocks, three-way	55

Engine Trimmings.	
Compression and Mississippi Gauge Cocks	55 %
Common Lubricators and Oil Cups	60 %
Register Gauge Cocks, List. ½ $1, ¾ $1	55 %
Felthousen Gauge Cocks	50 %
Cylinder Cocks, Straight or Bibb	50 %
List Pipe Size, ⅜ ½ ¾ Cylinder Cocks, with Coupling, $1.75, $2 25, $3	50 %
Steam Guage Cocks	65 %
Water Gauges. List 2 Rod Rough, ⅝ x 12 glass, ½ Pipe $3	60 %
List 2 Rod Finished, ⅝ x 12 glass, ½ Pipe $5.75	
List 4 Rod Finished, ⅝ x 12 glass ½ Pipe $6	
List 4 Rod Finished, ¾ x 16 glass, ¾ Pipe $10	
Scotch Glass Tubes	75 %
Steam Whistles and Valves, except below.	60 %
Mocking Bird Whistles	50 %
Single Bell Chime Whistles	15 %

	No. 1. Without valve.	No. 2. With upright valve.	No. 3. With side valve.
List diam., 2	$5.00	$6.50	$7.50
List diam., 3	8.00	9.50	11.00
List diam., 4	14.00	16 00	18.00
List diam., 5	22.00	25.00	28.00
List diam., 6	30.00	35.00	38.00
List diam., 8	70.00	85.00	90.00
List diam., 10	110.00	130.00	140.00
List diam., 12	150.00	180.00	200.00

Steam Gauges 50 %
Except No. 10, $27 per dozen.

Lunkenheimer Goods.	
Lunkenheimer Regrinding Valves	50&10 %
Lunkenheimer Jenkins's Disk Valves (Jenkins's List)	50&10 %
Lunkenheimer Radiator Valves	50 & 10 %
Lunkenheimer Radiator Valves, Jenkins's Disk	55&5 %
Lunkenheimer Peet Gate Valves	50&10 %
Lunkenheimer Balanced Throttle Valves	45 %
Lunkenheimer Lock Safety Valve	50 %
Hammer's Automatic Cylinder Cocks	50 %
Cody Oilers	50 %
Loose Pulley Oilers	45 %
Plain Oil Cups, Hinge Lid	55&5 %
Lunkenheimer's Plain and Slide Top Cups	55&5 %
Lunkenheimer's Automatic Cups	55&5 %
Thompson Oil Pump	50 %
Lunkenheimer's Index Lever Cups	55&5 %
Lunkenheimer's Needle Valve Oilers	50 %
Lunkenheimer's Automatic Sight Feed Lubricators	50 %

Special.	
Lunkenheimer's S. Brand Globe and Angle Valves	60 %

Tools.	
Baxter Wrenches, 35 %; Bemis & Call Wrenches	37½ %
Alligator Wrenches, 50 %; Stillson Wrenches	35 %
Pliers, 67½ %; Common Tongs	50&10 %
Brown's Tongs, List No. 1, $1 30; 1½, $1.65; 2, $2.; 3 $3; 4, $5; 5, $11; 6, $25	65 %
Acme Tongs, 15 %; Robbins's Tongs	15 %
Lifting and Sliding Tongs	50 %
Barnes's Cutters, 50 %; Stanwood Cutters	50&10 %
Saunders' s Cutters	45 %
Die Plates and Dies	62½ %
Taps, ⅛ to 2, 70&10 %; 2½ and 3, 60& 10 %; Reamers, ⅛ to 2, 50&10 %; 2½ and 3	60&10 %
Duplex Die Stock	40 %
Jarecki Screw Plates	25 %
Lightning Taps and Dies, 40 %; Pump Plates	60&10 %
Forbes's Die Stocks	Net
Pipe Machine	Special
Rachets, low list	40 %
Pipe Vises	50 %
Malleable Vises, 25 %; Smith's Vises	40&10 %
Little's Pipe Holder, 15 %; Watson's Improved Pipe Lifter	35 %

Water Work and Plumbers' Goods

Water Goods, Key work ..... 60 %
Water Goods, Compression ..... 57½ %
Iron Sinks, Plain, 60&10 %; Galvanized 40 %; Enameled ..... 50 %
Steel Sinks, Painted, 33⅓&5 %; Galvanized and Enameled ..... 50&5 %
Globe Ventilators ..... 40 %
Crescent Hydrants, 70 %; Crescent Street Washers, send for circular ..... 70&10 %
Wall Hydrants ..... 55 %
Curb Boxes ..... 50&10 %

Well Machinery.

Hydraulic Outfits ..... 20 %
Outfit Fig. A 28 ..... 15 %
Outfit Fig. A 29 ..... 30 %
Horse Powers, 2-horse and 4-horse, single gear 40 %; balance ..... 30 %
Expanding Drills ..... 20 %
Drills, Figs. A 26, A 35, A 33, A 32, A 34 ..... 55 %
Drills, Fig. A 37 ..... 20 %
Cross Drill, Fig. A 39 ..... 40 %
Steel Shoes ..... 06 %
Valve Grabs ..... 50 %
Stuffing Boxes ..... 50 %
Wood Rod Coupling, plain, 12½ %; galvanized ..... 18 %
Tubular Well Valves, 2 inch, per set $1.75
Blind Valves ..... 50 %
Steel Drive Leads and Swivels ..... 40 %
Pipe Pullers, No. 2, net, $3.00; balance ..... 25 %
Rope and Grab Hook ..... 40 %
Tube Well Combinations, 2-inch, Fig. A 56, net $7.00
Tube Well Combinations 2-inch, Fig. A 55, net 6.00
Augers, Twist and Ribbon ..... 55 %
Drill Jars ..... 30 %
Hercules Machines, No. 1 ..... 20 %
Drilling Tools ..... 20 %
Ajax Engines ..... 20 %
Challenge Augers ..... 20 %
Auger Tools ..... 10 %

Wood Pumps, Chain Pumps, &c.

Wood Pumps, extra finish, Revised List ..... 55&5 %
Chain Pump material ..... 50&10&5 %
Chain ..... 5¢
Goss New Patent Bucket ..... per doz., $1.00
Tubing ..... per foot, 3¢

Pumps.

Cistern Pumps, Fig. 200, 60 %; Pitcher Pumps ..... 70&10 %
Set Length Lift Pumps, 60&10,%; Force, except as below ..... 60 %
Northern Star Force Pump, Fig. 699 ..... 50&10 %
Gould's new Double Acting Pump ..... 45 %
Deep Well Standards ..... 50 %
Iron Cylinders, except as below ..... 75&10 %
Brass Lined and Brass Body Cylinders ..... 70&10 %
Cylinders, Fig. 615, 60 %; Fig. 621 ..... 50 %

Foot Valves.

Foot Valves, Figs, 471, 472, 473, 1½ and smaller, 60&10 %; 3 inch and Larger ..... 50&10 %
Foot and Check Valves, Figs. 474, 475, 476 ..... 50&10 %
Foot and Check Valves, 667, 60 %; 760, 70 %; 742 ..... 60 %
Globe Strainers, 40 %; Figs, 658, 659, 660 ..... 60&10 %
Float Valves and Floats ..... 50 %
Pump Rod, Drawn Steel, Special, ⅜ and 7-16, plain, 4 %; ⅜ and 7-16, Galvanized ..... 4½ %
Rod Couplings, plain, ₩ lb, list 25; Galvanized, list 25 ..... 25 %
Brass Rod Couplings, 40¢ ₩ lb ..... net
Gas-Pipe Coupling and Guides ..... 40 %

Well Points.

Washer Points, 70 %; Radial Center ..... 50&10 %
Brass Jacket Points, 1¼ x 24 x 80 hole, Nos. 50 or 60 Gauge, doz. net $9
Brass Jacket Points balance of list ..... 70&10&5 %
Drive Heads, Iron and Steel, 25 %; Malleable Caps ..... 50 %
Drive Head, Hardwood Caps ..... 25 %
Goose Necks, Air Chambers and Cocks ..... 50 %

Windmill Pumps

Windmill, Lift Standard, except Fig. 752 ..... 60 %
Figure 762, No. 3, 1¼ x 6 ..... $2.25
Figure 762, No. 4, 1¼ x 6 ..... 2.50
Figure 762, No. 5, 1¼ x 6 ..... 2.75
Figure 762, No. 4, 2 x 10 ..... 2 75
Figure 7.2, No. 5, 2 x 10 ..... 3.00
Wind Mill Force Standards ..... 60 %
3 Way Pumps, Fig. 670 ..... 60 %
3 Way Pumps, Fig. 736, 6 in., $7.50; 10 in., $8.00
3 Way Pumps, Fig. 791, 6 in., 7.00; 10 in., 7.50
3 Way Pumps, Fig. 809, 1¼ x 6 inches 6.75
W. M. Working Heads ..... 40 %
W. M. Heads, Fig. 447, 60&10 %; 448 ..... 40&10 %
Double acting W. M. Pumps, Figs. 688 and 689 ..... 40 %
Syphon Working Barrels, Figs. 514 and 776 ..... 40 %
Well Pump Head and Deep Well Cylinder ..... 30 %

Hand and House Force Pumps.

Hand Force Pumps, iron, 50 %; brass ..... 45 %
Vertical Power Piston Pump, 40 %; Globe Pump 25 %
Single Acting House Force Pump, iron, 50 %; brass ..... 50 %
Double Acting House Force Pump, iron, 45 %; brass ..... 40 %

Railroad and Ship Pumps

Star R. R. Force Pump, 40 %; Meteor ..... 45 %
Counter Shafts, 25 %; Cornish Head ..... 30 %
Deep Well Cylinders ..... 30 %
Alert Double Acting Pump ..... 50 %
Challenge and Monitor Pumps ..... 35 %
Alert Double Acting Power Pump ..... 40 %
Challenge Double Acting Pulley Pumps ..... 30 %
Brass Two-Cylinder Ship Pumps ..... 30 %
Two-Cylinder Pumps ..... 30 %
Deluge Bilge Pumps ..... 30 %
Hand Boiler Feed Pump ..... 40 %
Boiler Feed Pumps, except Fig. 709 ..... 30 %
Fig. 709 ..... 25 %

Rotary Pumps, &c.

Hand Rotary Pump ..... 40 %
Hand Rotary Barrel Pump ..... 35 %
Power Rotary Pump ..... 40 %
Power Geared Rotary Pump ..... 25 %
Portable Garden Pumps ..... 50 %
Portable Force Pumps ..... 35 %
Union Hand Engines ..... Special
Pacific Portable Force Pump ..... 40 %
Brass Air Pump ..... 40 %
Plumbers' Force Pump and Drip Pump ..... 50 %
Air Pump ..... 30 %
Beer Pump and Test Pump ..... 50 %
Hydraulic Rams ..... 40 %

Bells, &c.

Meneely Pure Bell Metal Bells ..... Per ₩ 28¢
Hangings, Discount ..... 20 %
Steel Amalgam Bells, Fig. 758 ..... 70&10 %
Steel Amalgam Church Bells, Fig. 359 ..... 40&10 %
Wrought Iron Jack Screws ..... 70 %
Cast Iron Jack Screws, 3x24 ..... Net, $1.75
Wrought Iron and Cast Iron Cider Press Screws and Pump Repairs ..... 50 %

Their quotations on Belting, Packings, Hose, &c., made date February 1 are as follows:

Belting.

New York Belting and Packing Company's

Standard Rubber Belt ..... 60&10 %
Extra Rubber Belt ..... 50&10 %
Fine Para Rubber Belt ..... 40&5&5 %
* Crown Rubber Belt ..... 70&5 %

* Not made by N. Y. B. and P. Co. Not guaranteed.

New York Leather Belting Company's

Agricultural Leather Belt ..... 60&10&5 %
Standard Leather Belt ..... 50&10 %
Short Lap Leather Belt ..... 50 %
Monarch Leather Belt ..... 45&5 %
Patent Laced Leather Belt ..... 40 %
Electric Leather Belt ..... 50 %
Patent Sewed Leather Belt ..... 40 %
Cotton Belt ..... 60&5 %
Underwood Mfg. Company's Belting Specialties.
Patent Cotton-Leather Belt ..... 50&10 %
Angular Belt ..... 10 %
Patent Solid Round Belt ..... 45 %
Round Solid Belt ..... 50&10 %

½	3-16	¼	5-16	⅜
5¢	7¢	10¢	14¢	18¢

Round Twist Belt ..... 40&10 %

Packings.

New York Belting and Packing Company's.

Empire Sheet, C. I ..... 70&5 %
Empire Sheet, C. B. S ..... 70&5 %
Empire Sheet, C. O. S ..... 70&5 %
Empire Sheet Packing, less than 1-32 ..... 50&10 %
Wire Insertion Packing ..... 40&5 %
Pure Valve Gum ..... 60 %
Fibrous Gaskets or Rings, ⅛, 90 cents; 5-32, 80 cents ..... 50&10 %
Cloth Insertion, 1-16, $1.25; 3-32, $1 ..... 50&10 %
"Salamanda" Self Vulcanizing ..... 35&5 %
Square and Round Piston ..... 50&10&5 %
Extra Pump, for hot water ..... 50 %
Black Elastic Back, sq. Piston ..... 60&10&5 %
White Elastic Back, sq. Piston ..... 50&10&5 %
Ball Valves ..... 50&5 %
Flat Valves ..... 60 %
Empire Gum Core, full coil ..... 27½¢ lb
Crown Gum Core, less ..... 30¢ lb.
Soap Stone Packing ..... 12¢ ₩
Square Flax, extra quality ..... 60¢ ₩
Graphite Packing, ¾ in. and 1 in. only ..... 75¢ ₩
American Hemp, best 12½¢ No. 3 ..... 10¢
Italian Hemp, "B," best 16¢, No. 2 ..... 12½¢
Italian "A," best 20¢ No. 2 ..... 14½¢
Asbestos Millboard ..... 12¢
Asbestos Paper, John's ..... 12¢
Asbestos Rolled Cloth, Rubber Core ..... 50¢
Asbestos Rope ..... 25¢
Asbestos Wick ..... 25¢
Asbestos Wick, Braided ..... 25¢
Asbestos Rub. Tape, 1¼ x 3-16 ..... 50¢
Asbestos Square Rub. Back ..... 60¢
Asbestos Rubber Sheet Packing ..... 60¢
Candle Wick ..... 25¢
Peerless (R. & D.) Piston Packing ..... 60¢

Hose.

New York Belting and Packing Company's Hose in 500-foot Bales and 50-foot Lengths.

Standard ..... 70&5 %
Extra ..... 50&10&5 %
Fine Para ..... 40&5 %
Cable R. L. Cotton, ¾ inch ..... 11¢ net
Cable R. L. Cotton, 1 inch ..... 18¢ net
All other sizes Cable ..... 25&5 %
Empire Linen Hose, Unlined ..... 30&5 %
Empire Linen Hose, Rubber-Lined ..... 30&5 %
Extra Heavy Steam ..... 50 %
Empire Steam ..... 50&10 %
Extra Brewers' ..... 50&5 %
Dundee Brewers' ..... 50&10 %
Empire Air Brake (Brewer's list) ..... 60&5 %
Petroleum Oil (Brewer's list) ..... 50&5 %
Standard Suction, uncut ..... 50&5 %
Dundee Suction, uncut ..... 60 %
Ex. Quality "Para" Suction Hose ..... 40&10 %
Swinging Hose Rack ..... 20 %
Pure, Plain and Corrugated Tubing, Heavy ..... 5&5 %
Pure, Plain and Corrugated Tubing, Light ..... 6&5 %

Belting and Hose Attachments.

Best Tanned Lace Leather, { Dozen sides ..... 21½¢ sq. ft. / Less ..... 22½¢ sq. ft.
Best Cut Tanned Lace ..... 60 %
Metal Tip, { Gross, in Boxes ..... 15 %
Tanned Lace, { 100-foot Bunches ..... 50 %
Best Rawhide, { Dozen Sides ..... 22¢ sq. f. / Less ..... 23¢ sq. ft.
Best Cut Rawhide ..... 40 %
Lace Cutters ..... 4¢ net
Standard Belt Fasteners ..... 40 %
Blake's Belt Studs ..... 40 %
Oval Point Belt Hooks ..... 75 %
Copper Rivets and Burs ..... 50 %
Smith Belt Fasteners ..... 30 %
Round Belt Couplings ..... 50&10 %
Belt Punches ..... 40 %
Belt Awls ..... 40¢ net
Belt Cutters, Leather ..... 25 %
Belt Cutters, Rubber ..... 25 %
Hose Couplings ..... 55 %
Hose Clamps ..... 55 %
Hose Pipes, P. S. T ..... 55 %
Hose Pipes, C. O. L. E ..... 55 %
Lawn Sprinklers ..... 50&10 %
Gem Nozzles ..... $5.50 per doz.
Boss Nozzles ..... 5 %
Magic Nozzles, ¾ in., $12; 1 in. doz., $15 ..... 50&10 %
Fuller Nozzles ..... 33⅓ %
Hose Strap Fasteners ..... ½ to 1 in 40¢ each
Hose Strap Fasteners ..... 1¼ to 1½ in. 60¢ each
Hose Straps ..... 45 %
Hair Felt, ½ in ..... 6¢ sq. ft.
Hair Felt, ¾ in ..... 6½¢ sq. ft.
Hair Felt, 1 in ..... 7¢ sq. ft.
Empire Tin Elevator Buckets ..... 55 %
Empire Iron Elevator Buckets ..... 40 %
Acme Steel Cups ..... 35 %
Excelsior Mill Elevator Buckets ..... 60 %
Avery Seamless Elevator Buckets ..... 40&10 %
Corrugated Bolts, ½ to ¾ in ..... $5.50 ₩ M
Corrugated Bolts, 1 in ..... 8.50 ₩ M
Holly Hose Reel, No. 1 ..... $2.75
Holly Hose Reel, No. 2 ..... 3.50
No. 1 Success 1.25
No. 2 Success 1.15
Eureka Folding, No. 1 ..... 1.35
Eureka Folding, No. 2 ..... 1 90
Eureka, Fixed Arms, No. 1 ..... 1.00
Anti-Shaft Rattlers ..... 88¢ and $1.10 ₩ lb.
Fruit Jar Rings ..... 80¢ to $1 ₩ lb
Compound Fruit Jar Rings ..... 40¢ ₩ lb.
Gauge Glass Washers ..... 12¢ doz.
Grain Drill Tubes, 3 to lb ..... 50¢ ₩ lb.
Matts and Mattings ..... 25&5 %
Letters for same ..... 25¢ each
Wagon Springs, extra quality ..... 35¢ ₩ lb
Car Springs, extra quality ..... 70¢ ₩ lb.
Round Rubber Cord ..... 60&5 %
Standard Wringer Rolls ..... 41¢ ₩ lb.
Emery Wheels ..... 15 %
Rubber Cement ..... 40&5 %
Leather Cement ..... 60¢ ₩ lb.
Sankey's Life of Leather ..... $2.50 gal.

They also call attention to the following quotations on Cotton Waste, less than 100 pounds being 1 cent advance:

Best White, machine copp'd ..... 8½¢ ₩ lb
No. 1, White ..... 8 ¢ ₩ lb.
No. 2, White ..... 7½¢ ₩ lb.
Extra Colored ..... 6½¢ ₩ lb.
No. 2, Colored ..... 5½¢ ₩ lb
No. 3, Colored ..... 5 ¢ ₩ lb

The steam-heating arrangement on the Wisconsin Central motor, running between St. Paul and North St. Paul for several weeks past, has been so satisfactory that all the passenger coaches are to be supplied in the same manner. According to this system each car has two radiators, one on each side in the middle of the car, incased in wood, with openings on the sides and top. The pipes are run along the sides of the car. There is a condenser under the car from which the water is let out from time to time. The exhaust steam is used in heating.

What the Canadian Pacific Railway has cost the Dominion is the subject of inquiry by the Ottawa correspondent of the Boston *Herald*, who says: "According to the first and subsequent agreements, the Government gave the company completed railways to the value of $35,000,000; cash, $25,000,000; part of a loan abandoned, $10,000,000; proceeds of land-grant bonds, town sites and local bonuses, $11,000,000; 14,000,000 acres of land, yet in the company's hands at the price the balance was taken back by the government, $1.50 per acre, representing $21,000,000; cash given and promised in other deals, $17,000,000; in all, $119,000,000. The company claim that their right of way, construction, equipment and cost of handling their lands has been $80,300,000. On their own statement, instead of the road costing the company anything, the people of Canada paid for building it, and gave it a free gift of nearly $39,000,000 beside. This is without reference to the exemption from taxation and the monopoly which the company enjoy."

Graff, Bennett & Co., the well-known iron manufacturers, of Pittsburgh, have made an assignment to P. H. Miller. It is said that the cause of the failure was the recent suit of the Grafton Iron Company and the closing down of the Pennsylvania Tube Works, to whom the firm sold the greater part of their product. As near as can be learned, the liabilities are $1,200,000, with assets amounting to about $800,000. The firm was granted an extension about five years ago.

Foreign Markets.

EQUIVALENTS.

	Cents.
Franc, Peseta or Lira	19.3
Florin (Netherlands)	40.2
Florin (Austria)	35.9
Milreis (Portugal)	$1.08.
Milreis (Brazil)	54.6
Mark (Germany)	23.8
	Pounds.
Kilogram	220.5
Picul	134.

GREAT BRITAIN.

The Pig-Iron market has been weak. As regards the North of England, our Middlesboro' correspondent writes: Our Pig-Iron market remains quiet, with prices tending downward, in sympathy with the depressed market in Glasgow warrants. There is a restricted demand, purchases being made only for immediate wants. On the other hand, there is very little Iron offering, because makers, being well sold forward, are not offering to sell at prices currently quoted. Small parcels have been done this week. No. 3, 31/6 @ 31/9; Hematite Bessemer, 43/ @ 44/; Basic, 34/ @ 34/6. In Lancashire and East Worcestershire the tone is dull, but prices are unchanged. Prices are weaker in Staffordshire. In the Northwest the demand for Bessemer Iron has been steady, at 43/6 @ 44/, net, f.o.b., for mixed numbers. At the same time, Hematite warrants have been as low as 42/ @ 42/6. Spiegeleisen is quoted at 75/. There is only a comparatively quiet trade doing in Steel Crop Ends, but the transactions which are noted are at from 44/6 to 50/6. The Glasgow warrant market has been dull, and prices to-day close flat, as follows: 39/1 @ 39/1¼, cash, and 39/4¼ one month.

The return of the Cleveland Ironmasters' Association for January shows that the make of Pig Iron was 216,838 tons, of which about 118,800 tons were made from Cleveland Ore and 98,000 tons from Hematite and other Ores. The total make was about 2000 tons more than that of December. There are now 95 furnaces blowing, against 89 a year ago, and 52 of these are making Cleveland Iron, against 51 in 1887. Stocks amount to 644,281 tons, against 637,682 in December, and 651,517 tons a year ago.

The Finished Iron trade of the North of England remains unchanged. Prices are steady for Ship Plates at £5, and for Boiler Plates at £6; but Bars are a little easier at £4. 17/6, and Angles at £4. 12/6. Manufactured Iron, especially for shipbuilding purposes, is in good request, at fully late rates, at Newcastle: Ship Plates at £5. 2/6, Common Bars at £5, and Boiler Plates at £6, while Angle Iron realizes £4. 15/. Trade in best Yorkshire Iron remains quiet, and there is but a small business doing in Lancashire. Trade in East Worcestershire is rather less animated. Trade has been steady in North Staffordshire, while in South Staffordshire trade has been quiet, the Sheet-makers being still the best employed. Singles are £6. 5/ @ £6. 10/, and Doubles £6. 15/ @ £7. Bars are meeting with severe competition from Steel. Best Bars are £7. Second-class branded Bars are £6, while Merchant Sorts are £5. 10/, and Common, £5 @ £5. 5/. The Tin-Plate market in South Wales is steady.

There is a firmer tone in the Steel trade of the Northwest. Plates are at from £7 to £7. 5/, net, f.o.b., and Angles at from £6. 5/ to £6. 10/. There is a fair demand for Blooms at from £3. 12/6 to £3. 15/, but not much business has been done. Slabs are quiet at £4. 2/6, and Billets are brisk at £4. 5/. Steel Rails are in better request, but prices remain low at £4 for heavy sections to £4. 5/ for lighter sections. The Scotch Steel works are very busy. Steel is in active demand in the North of England, but prices are not strong. Rails are from £4 at works, and Steel Ship Plates are £7. As regards shipbuilders, fresh orders are being placed on the Tyne; but otherwise there is nothing new. Engineers are, as a whole, fairly well employed.—*Economist, February* 11.

Tin Plates.—There has been but little business in Tin Plates, in consequence of the uncertain state of the market. Many of the makers are extending their works. A great deal of the business this week has been in Bessemer Steel Cokes and Coke Tin Plates, at prices varying from 14/1 and 14/3 @ 14/6, IC, Welsh seaports, and a few orders were booked in Siemens Steel Cokes at 14/9 and 15/ @ 15/3, IC. Coke Tin and Steel Wasters are not much inquired for, and the price varies from 13/6 to 13/9 and 13/10½; there may be some few exceptional brands which fetch 14/, but they are not many. There is but a slight demand for Terne Plates, and the same may be said with respect to Charcoal and Best Charcoal Tin Plates. The prices of former range from 12/ to 13/ and 14/, IC, and Charcoal Tins are 15/6 @ 16/6, IC, while Best Charcoals are 17/ @ 18/ and up to 20/, IC. —*Colliery Guardian, February* 10.

EAST INDIES.

SINGAPORE, January 2, 1888.—*Tin.*—Sales amount to 430 tons at up to $56.37½ ₱ picul, with sellers at $56.25, and possibly buyers at $56. Shipments in December were 2400 tons to London and 85 tons to the United States. There have been floods in the mining districts which will tend to reduce the supply available during January. *Tonnage.*—London rates are higher and tonnage is scarce. For New York via Cape the Oneida has cleared and will be followed on the berth by the L. D. Carlton coming from Penang. Rates are unchanged. For Boston the Tenny Parker continues her loading. *Exchange* is weak at 3/3 for six months' sight credits.—*Gilfillan, Wood & Co.*

SINGAPORE, February 17, 1888.—*Tin.*—Shipments during the fore half of this month to the United States from Singapore and Penang amount to 200 tons, against 150 tons same time last year; to England, 800, against 600 since January 1. The shipments have been respectively 600, against 700, and 4300, against 1300.—*Gilfillan, Wood & Co. to Charles Nordhaus per cable.*

MANILA, January 30, 1888.—*Hemp.*—Fair current declined during the week from £30. 5/ to £29. 10/, cost and freight, receipts amounting to 8000 bales, and since January 1 to 34,000. *Exchange*, 3/3.—*Smith, Bell & Co.*

COLOMBO, January 5, 1888.—*Plumbago.*—The market has been steady and moderately active, Large Lumps selling at 145 rupees ₱ ton; Ordinary Lumps at 115 @ 142.50; Chips at 80 @ 90, and Dust, 37.50 @ 60. There have been shipped since October 1, 28,730 cwt. to England, 38 to Marseilles, 491 to Hamburg, 1317 to Antwerp, 62 to India, and 41,875 to the United States, together 72,513, against 67,607 in 1887, 40,649 in 1886 and 37,047 in 1885. *Coir Yarn*, No. 1 to 4 is selling at 7 to 12 rupees ₱ cwt. *Exchange*, six months' sight, 1/5 7-16.—*Volkart Brothers.*

AUSTRALIA.

MELBOURNE, January 26, 1888.—The *Iron* market remains quite active, Galvanized Iron having improved 10/ ₱ ton during the week. *Fence Wire* is wanted, but has not been raised yet.—*Per Cable via England.*

BRAZIL.

PARA, February 14, 1888.—*India Rubber.*—Our market has been brisk and stiffening during the week, Amazon Rubber advancing 50 reis to 2400 reis ₱ kg., which is the closing figure.—*Per cable direct.*

CHILI.

VALPARAISO, December 23, 1887.—*Copper*—In spite of the advance in exchange this metal has improved considerably in sympathy with the favorable cable news from London. Purchasers, it is true, operate very cautiously, as, however, a great many producers are under contract for a long time to come, little Copper is offering, altogether 22,077 tons have changed hands at $28 @ $31.90, the latter price being equal to £82. 11/ ₱ ton, with 30/ freight and 26¾d. exchange.

Nitrate of Soda.—This article has been quiet and nominal at $2.62½ @ $2.65 for 95 % November-December shipment. At the close there is a slight revival and sales foot up 195,000 quintals at $2.50 @ $2.62½ ₱ quintal, the first-named price equaling 7/8¾d. with 25/ freight to England. Charters have been made for Europe to the extent of 15,300 tons, and 2000 fons for the United States.

Following are the shipments made for the first 11 months:

	1887. Quintals.	1886. Quintals.	1885. Quintals.
To Northern Europe	11,424,283	7,048,573	7,747,080
To the Mediterranean	237,875	163,092	41,930
To the United States on the Atlantic	1,348,117	1,313,523	827,296
To the United States on the Pacific	207,446	255,505	77,712
Totals	13,217,721	8,780,693	8,694,018

Coal has been firm; Newcastle December shipment may be quoted 32/; for Australian 27/9 have been paid, and later on 28/9 were offered in vain. *Exchange*, 90 days, London, 26½d. —*Weber & Co.*

SPAIN.

BILBAO, January 28, 1888.—*Iron Ore.*—Comparatively little has transpired in the way of sales during the week, which does not prevent the mining companies from asking more and more money for their ore. The quotation is 8/ for Campanil, and 6/10 @ 7/3 for Rubios. Shipments of ore have amounted to 81,594 tons for export alone, which is a great deal, and has never been reached yet during winter time in a single week. Exportation so far this year sums up to 176,019 tons against 268,172 last year. *Pig Iron.*—Coastwise shipments sum up 1488 tons, there having been no export.

Exportation from Spain during the first 11 *Months.*

	1885. Tons.	1886. Tons.	1887. Tons.
Calamine	32,485	25,009	21,873
Pyrites	726,424	621,834	701,841
Iron Ore	3,546,883	3,791,819	4,923,947
Pig Iron	15,912	46,882	102,798
Precipitate	24,962	24,794	25,500
Quicksilver	1,911	541	11,122
Pig Lead	108,004	103,149	119,637
Totals	4,456,581	4,614,023	5,926,648

It will be noticed that there is an increase in everything except Calamine.—*Bilbao Maritimo y Comercial.*

GERMANY.

HAMBURG, February 11, 1888.—*Iron.*—The situation in Rhenish-Westphalia has gone on improving, there being a lively inquiry for all sorts of Pig Iron. Spiegel has risen to 58 marks, and 59 is being asked at Siegen. Forge Pig may be quoted 53. Foundry do. remains steady, both Bessemer and Thomas continue tending upward, the former bringing 54 marks ₱ ton. Luxembourg Forge Pig is worth 38 marks. In 1887 Germany produced 3,907,564 tons of Pig Iron, as compared with 3,339,803 in 1886. Merchant Iron has remained quiet, but steady; the domestic demand is good, while that for export is slack. It continues selling comparatively low, not bringing over 125 marks, a figure which is not by any means very remunerative. This may also be said of Hoop Iron at 140 marks. Boiler Plates are wanted more and more, and firmly held. The demand for Thin Sheets is also picking up a little at 150 @ 151, but this is hardly the season for it. In the Wire branch there is absolutely no change. In Upper Silesia Forge Pig is actually getting scarce. Although production last year was considerably in excess of that of 1886, this scarcity is significant. Foundry Pig has been steady in that Iron district; the foundries of Silesia have made arrangements for a common sales office. *Metals* have remained quite stiff. —*Borsenhalle.*

BELGIUM.

BRUSSELS, February 11, 1888.—*Iron.*—The tendency of Finished Iron is downward. Business is falling off perceptibly. Prices are kept up nominally, but it is more difficult to get consumers to subscribe to them. There would have to be a radical change in the general situation among us to restore the equilibrium between the finished article and the raw material to produce it. The Iron works having their own blast furnaces would, of course, be able to get along by lowering the price of Finished; but, on the one hand, they belong to the syndicate, and are consequently forbidden to do so; and, on the other hand, their contracts for Coke are about to expire, and before they can renew them and feel safe they decline selling any Iron for forward delivery. Meanwhile, Northern France begins to compete with us abroad in Beams and Merchant Iron, and is underselling us. At the same time, Structural Iron works complain of a lack of orders. Car works have booked some, but not all of them. Locomotive-makers also complain; bridge-makers did receive some orders, but they do not aggregate an important figure. Steel works likewise apprehend a falling of in the activity so far kept up.—*Moniteur Industriel.*

FRANCE.

PARIS, February 11, 1888.—*Metals.*—With the exception of Tin there has been a general decline and business has become quite irregular. We quote *Copper*, Chili Bars, 190 @ 195 francs ₱ 100 kg.; Ingots and Slabs, 192.50; Best Selected, 197.75, and pure Corocoro Ore, 185; *Tin*, Banca, 425; Billiton, 420; Straits, 440, and English, 420; *Lead*, 37 @ 38, and *Spelter*, 53.50 @ 54.50. *Iron.*—Our correspondent writes us from Valenciennes: "The rise in prices which was unanimously resolved upon latterly in this district has now been generally accepted, but it should be remarked that consumers are holding back a good deal, showing little alacrity to replenish their supply." We cannot see, however, that they can persevere in this attitude for any length of time, and the probability is that 14 francs for Merchant Iron will not yet be abated from for many months to come, unless the spring trade should prove a great disappointment, which is not likely.—*Moniteur des Interets Materiels.*

The official statement of the Tamarack Mining Company shows their production for the last six months of 1887 to have been 4,617,371 pounds fine copper. The total cost per pound of refined copper laid down in New York and sold was 5.39 cents, and including the construction and cost of shaft 2, 7.37 cents.

Exports.

The following table presents the exports of Hardware, Iron, Steel, Metals, &c., from the port of New York for the week ending February 21, 1888:

Argentine Republic

	Quan.	Val
Agateware, cs	2	$20
Pumps, pkgs.	49	1,826
Clocks, pkgs..	168	4,078
Forges	30	384
Windmill.....	1	60
Wash. ma. cs	28	447
Mf. iron, pkgs	25	225
Mach'y, pkgs.	24	1,700
Cutlery, cs....	79	1,160
Hdw., cs.....	128	3 210
Ag.imp., pkgs	1684	27,029
Sew ma., cs..	376	7.175
Cartridges,cs,	54	1.008
Guns, cs.....	3	349

Aberdeen.

Ag.imp., pkge	1	60

Arendal.

Hdw., cs.....	56	706

Amsterdam.

Ag. imp. pkgs	19	170
Hdw., cs. ...	73	1 361
Clocks, pkgs.	9	126
Pumps, pkge.	1	26

Antwerp.

Ag. imp.,pkgs	3	41
Sew. ma., cs..	265	3,699
Copper, csks..	23	7,530

British Australia.

Mach'y, pkgs.	10	1,165
Pumps. pkge.	1	44
Nails, cs.....	6	30
Mf. iron, pkgs	12	100
Ag.imp., pkgs	2	60

British West Indies.

Hdw., pkgs...	3	15
Nails, bxs.....	2	5
Mf. iron, pkgs	85	377
Mach'y, cse..	1	25
Nails, kegs...	9	33
Tinware, cs...	3	75
Sew. ma. cs..	4	107

British Honduras.

Sew. ma.. cs.	4	84
Cutlery. cs ..	3	42
Nails, kegs...	14	30
Tinware, cs...	2	20
Hdw, pkgs...	19	276
Firearms, cs..	3	133

British Possessions in Africa.

Hdw., cs.. ..	9	73

Bremen.

Mach'y, pkgs.	8	1,518
Guns, cse.....	1	25
Hdw., cs.. ...	2	45
Wringers, cse.	1	50
Mf. iron, pkge	1	20

British East Indies.

Sew. ma., cs.	4	161
Clocks, pkgs.	39	1,156

Central America.

Mf. iron,pkgs.	184	1,178
Sew. ma.. cs..	32	716
Hdw., pkgs...	34	529
Ag. imp., pgs.	9	101
Mf. of copper, pkge.... .. .	1	26
Cutlery, cs...	4	166
Tinware, pkgs	2	62
Firearms, cs.	3	203
Zinc, casks...	6	47
Mach'y, pkgs.	71	781
Cartridges, cs	10	465
Pump	1	17
Brass goods, cs.....	2	14
Steel, pkgs....	6	95
Nails, kegs,...	24	54

Cuba.

Mf. iron, pkgs	1163	7.235
Mch'y, pkgs..	52	3,999
Tacks, cs.....	6	98
Tinware, cs...	2	16
Nails, kegs...	549	1,337
Copper kettle	1	185
Pumps, pkgs.	5	589
Tin, pigs.....	4	112
Zinc, plates..	8	31
Metal, cs.	2	26
Spikes, kegs..	40	92
Hdw. pkgs....	238	2,721
Clocks. pkgs.	6	103
W. mills, pkgs	3	35
Ag.imp., pkgs	54	876
Nails, cs.... .	17	165
Car wheels...	4	140
Cutlery, pkgs.	191	3.972
Wire cloth, cs,	8	252
Sew. ma., cs..	116	1,000
Iron safe.....	1	250
Iron, sheets..	8	316
Steel pkgs....	2	33
Brass goods, case	1	42

China.

Mach'y.. pkgs	94	3,827
Clocks, pkgs..	20	240
Hdw., cs.....	6	179
Mf. iron, pkgs	158	2,333

Chile.

Hdw., cs.. ...	1	28
Mach'y., pkgs	3	330

Christiania.

Clocks, cs....	9	94
Hdw., cs.....	51	533

Copennagen.

Hdw., cs.....	4	47
Mach'y., pkgs	2	76
Ag.imp., pkgs	2	67

Dutch East Indies.

Guns, cs.....	4	521
Hdw., cse ...	1	27
Cutlery, case.	1	140

Dublin.

Mf. iron, pkgs	8	105
Ag. imp. pkge	1	55
Hdw., cse.....	1	11

Ecuador.

Sew. mach..cs	3	150

Gibraltar.

Clocks, cse....	1	25
Sew. ma., cse	1	18

Glasgow.

Tinware. cse	1	46
Mach'y, pkge.	1	332
Sew. mach..cs	228	1,9 3
Hdw., pkgs...	29	311

Hull.

Mach'y, pkgs.	3	65
Hdw., cs	8	350
Scrap steel, pkgs.....	10	100

Hong Kong.

Clocks, cs....	60	1,306

Hamburg.

Ag.imp., pkgs	15	583
Sew. ma.. cse.	1	50
Pumps, pkgs.	2	48
Mach'y, pkgs.	7	653
Cutlery, cse..	1	10
Clocks, cs....	7	333
Hdw., pkgs...	22	800

Hayti.

Hdw., pkgs...	9	92
Sew. ma., cse	1	87
Mf. of copper, case	1	95
Zink, cks.....	3	110

Havre.

Mach'y, pkgs.	50	4,843
Ag. imp..pkgs	120	7,546
Copper,casks,	20	3,812
Copper, pgs..	767	40,000

Japan.

Nails, cs.....	20	77
Clocks, cs	44	591
Mf. iron, pkge	1	19

London.

Mach'y., pkgs	154	19,087
Ag.imp., pkgs	570	4,382
Sew. ma., cs..	100	10,087
Mf. iron, pkgs	15	425
Ptg.mach., cs	9	8,200
Clocks bxs. .	141	3,083
Hdw, pkgs...	166	3,659
Cutlery, cse..	1	60

Liverpool.

W. wheel.....	1	500
Hdw., pkgs...	10	271
Ag. imp.,pkgs	102	1,951
Clocks, cs....	2	235
Firearms,pkg	5	511
Copper, casks	224	34,166
Cop. matte, sks.....11,926		71,900
Mach'y.pkgs.	13	1,915
Sew. ma., cse	1	10
Brass spr'k's, cs	31	2,125

Liege.

Guns, cs.....	2	213

Mexico.

Nails, kegs ..	673	1,503
Firearms, cs.	5	772
Nails, cs.....	30	194
Mf.iron, pkgs	1599	8,203
Copper gds., pkgs.....	2	70
Clocks. pkgs.	9	145
Cutlery, cs...	5	74
Iron bars....	455	2 6
Brass goods, cs	3	136
Ag.imp., pkgs	17	138
Tin, pigs.....	12	372
Spikes, kegs.	75	334
Tacks, cs	2	26
Per. caps, cs.	2	62
Pumps, pkgs.	9	715
Tin plate, cs.	21	130
Hdw., pkgs..	95	1,682
Cartridges,cs	67	1,265
Sew. ma., cs.	39	707
Machy, pkgs.	129	5,817
Steel, pkgs ..	40	193
Tinware, cs..	3	56

Nova Scotia.

Hdw., cse....	1	12

New Zealand.

Guns, cs.. .	3	304

Naples.

	Quan.	Val.
Pumps, pkgs	6	174

Philippines.

Mf.iron, pkgs	3	217
Hdw., cse ...	1	44
Machy., pkgs	6	800

Peru.

W. cloth, box.	1	95
Hdw.. cs ....,	12	317
Firearms, cs.	2	213
Cartridges. cs	1	38

Porto Rico.

Pumps, pkge	1	131
Mf.iron, pkgs	11	52

Spanish Possessions in Africa.

Mach'y, pkgs	6	267

Stett'n.

Mach'y, pkgs	10	1,285

Santo Domingo.

Hdw.. pkgs ..	25	369
Sew. ma..pkgs	3	65
Mach'y, pkgs.	7	117
Mf.iron. pkgs.	55	188
Ag.imp., pkge	1	52
Nails, kegs...	202	470
Clocks, pkgs..	3	49
Tin plate, bxs	2	22

Uruguay.

Nails, cs.....	16	60
Macu'y. pkgs.	317	9,500
Arms, cse....	1	526
Cutlery, cs...	5	95

United States of Colombia.

Hdw.. pkgs...	157	1,595
Sew. ma., cs..	37	810
Mf. cop., cs...	5	115
Tacks, cs.....	12	158
Pumps, pkgs.	2	70
Iron, pkgs....	81	1,102
Engineers' supplies, cs.	15	735
Br'ss gds.,cse.	1	18
Chain, piece..	1	224
Ag.imp., pkgs	2	62
Cartridges,cse	1	81
Cutlery, cs....	43	683
Mach'y, pkgs.	36	3.427
Mf. iron, pkgs	96	525
Per. caps, cs..	2	45
Tinware, cs...	22	417
Clocks, cs.....	3	31
Steel rope, pkge.....	1	357
Nails. kegs...	113	285
Ox shoes, bxs.	51	620

Valladolid.

Pumps, pkgs..	2	66

Venezuela.

Sew ma.. cs ..	17	461
Mach'y, pkgs.	26	1,050

Zurich.

Iron goods, cs	2	103

Burning Petroleum Under Boilers.

In reply to many inquiries the managers of the Associated Factory Mutual Insurance Companies publish the following:

The methods of using a spray of oil vaporized by compressed air or by a steam jet, and those in which the petroleum is dissociated by heat into a permanent gas, have all been used in the generation of steam, for the furnaces of soda-ash reclaimers in chemical wood pulp works, and also in the forging of iron and steel. For the latter purpose this method presents features of especial value, by reason of the power to control and concentrate the heat, and also the absence of scale on the metal.

We have not interposed any objections to this use of oil for fuel whenever the petroleum or the residuum could be kept in closed iron tanks, safely placed in regard to the surrounding buildings, the pipe from the tank to the boiler-room preferably placed overhead, so that any leakage or accident would be apparent at once, and the pipe would form a syphon, preventing any flooding in case of accident to the pipe. We have been in correspondence on the subject with the Hartford Steam Boiler Inspection and Insurance Company, who have advised us that they hold similar views.

We have nothing to say upon the expense of the process, as the data which we have upon the subject is somewhat conflicting. There is no doubt but that this method possesses features of great economy in many details; and when one investigates the subject careful attention should be given to the several general expenses for and against the system, in comparison with coal, such as storage, handling, attendance and ability to start and stop the fire.

Treasury Decisions.

Certain wire coverings for bottles, made of iron wire so doubled and irregularly twisted together as to cover the bottle and hold the cork in its place, are held to be dutiable at the rates prescribed in Schedule C (T. I., 182) for "iron or steel wire nettings, made in meshes of any form"—that is to say, at a certain rate according to the size of the wire, and in addition to such rate 2 cents per pound. (Letter to Collector of Customs at New York, January 17, 1888.)

Steel bars which have been bent at right angles, so as to constitute the article commercially known as "steel angles," are held to be dutiable at the rate of 1¼ cents per pound, under the provision in Schedule C (T. I., 178) for "steel * * * angles." (Letter to Collector of Customs at San Francisco, January 18, 1888.)

Ironmongery in England.

BY KNARF.

The interesting sketch given in *The Iron Age* of January 12 of an English hardware store cannot fail to be of interest to every keeper of an American store in the same line. The different way they do business, possibly the way the shops are arranged, and the line of goods that are carried, would be a study for us this side of the water. The writer's ideas of English business and the way it is conducted, the style of the stores and the appearance of the employees, have been gotten entirely from Dickens. The pictures are so entertaining that, as a boy, the more old and dark and gloomy the building the older and more respectable the firm. But here we have a merchant who is wide awake and modern in his ideas, who sees the necessity of a well-trimmed show window and who believes in making changes in the goods oftener than once a year. He also believes in having seasonable goods to anticipate the season—enough to remind passers-by that before long they will want just such an article and that that is the place they can get it. The word "shop" is always associated in my mind with a blacksmith shop or a tinshop, and I have not become English enough to have the word yet convey to my mind a store. The master is the proprietor, and when we see him "drive down to business two or three hours a day" we see a different personage from the American hustler, who often unlocks the store before the tardy clerk puts in an appearance in the morning. How many old fossils there are around in the stores who can neither "sell nor serve," but are retained because of what they have done. Herein our English cousin teaches us a lesson. The effect of meeting a customer on entering the door and courteously showing him goods that he may ask the price on, even after he thinks he is through buying, will show on the amount of sales at the end of the year. The names of goods strike an American as strange. "Paints in tins" probably refers to ready mixed paints. For "Brunswick black," we know of nothing to correspond with that unless it be stove polish. But the word "brass foundry" is used to designate some kind of goods; it is too much for us. We have noticed the fact that the same patterns of pockets are made now that were made years ago in English cutlery. This is probably the reason we are advised to "choose about half-a-dozen good patterns and stick to them." With us we are always on the outlook for something new in cutlery, looking for more desirable patterns. We are surprised to find they keep "bedsteads." It seems to be a regular thing with them; now, do they keep all other kinds of furniture, we wonder? We take it the "stores" referred to are the co-operative stores we have read so much of. Should it ever be the writer's good fortune to cross the water, the cathedrals and picture galleries would not receive as much attention as the shops and other things that enter more fully into our every-day life. We should want to see how they weighed out nails, sold house-furnishing goods, what kind of stoves were used, and all other interesting things that a hardwareman would naturally look into. Of course we are conceited enough to think they do nothing as well as we can on this side. That our stores are more attractive than they would be in any other land or under any other fog. A person buying nails said to us that in Canada they always designate the kind of nails wanted by giving the inch. This was particularly strange to me, because I supposed, as the origin of "penny" was English, that they would call them the same way as we would.

MANUFACTURING.

Iron and Steel.

The Linden Steel Company, Limited, of Pittsburgh, have bought the Siemens' Rotator property in that city. The statement that it was purchased for the Yale Lock Company, of Stamford, Conn., is without foundation. The property was bought for the exclusive use of the Linden Steel Company, Limited, whose business is increasing so rapidly that it will be necessary to use the plant in the near future. The buildings are good, and the machinery is in first-class order, and it is probable that part of it will be used by the purchasers in their own business at once. The above-named firm are still busy on the Government orders for armor and hull plating, and are very successful in meeting the rigid requirements.

The largest brass casting that was ever molded in Pittsburgh was cast at the foundry of Mansfield & Co., Limited, in that city, on Friday, the 17th inst. It is what is called a "liner" for the inside of a large steel cylinder, to be used to operate the huge shears at the new plant of Carnegie, Phipps & Co., Limited, at Homestead, Pa. In shape it resembles a thimble, and is put in the cylinder to give more strength to the steel. The weight of the casting is between 6000 and 7000 pounds. When completed it will be 4 feet in diameter, 48 inches long, and 3 inches thick. The method of making the cast is described as follows: A pit eight feet square was dug in the earth and the pattern put in. Sand was then rammed around it and the latter backed up with fire-brick. When this was made solid the pattern was carefully lifted out and the hot metal poured in through two sluices. The brass was melted in open-air furnaces and the metal run out of the gas furnaces into ladles. It was then poured in the mold. It took 25 men to do the pouring, and the time required was 10 minutes. It took two weeks to make up the mold, and several days will be required to cool it.

The annual meeting of the stockholders of the Catasauqua Mfg. Company, of Catasauqua, Pa., was held on Wednesday, the 15th inst., and the following officers were elected: Oliver Williams, president; John Williams, secretary; Henry Davis, treasurer; Directors, Oliver Williams, Samuel Thomas, John Williams, Catasauqua; John Thomas, Hokendauqua; Fisher Hazard, Mauch Chunk; Theo. Sturges, New York; Wm. Henry Trotter, Chas. E. Haven, Justice Cox, Jr., Philadelphia.

On the 17th inst. Philip E. Chapin entered suit against the Cambria Iron Company of Johnstown, Pa., for expenses and salary due while he was general superintendent of the Gautier steel department, and general manager of the works at that place. The plaintiff states that he made a contract with the company for the former position at a salary of $10,000 per year from March, 1881 to December, 1883, when he was made general manager, at a salary of $12,000, which position he resigned on the 1st of January last. The amount due him during this period for salary and traveling expenses was $78,494. He has received $65,903, leaving a balance due, with interest, of over $15,700. The case will come on at June term. Mr. Chapin is the son-in-law of the late Daniel J. Morrell, who died in August, 1885. It is understood that the company will resist on the ground that he has been paid in full, and if there was such a contract made with Mr. Morrell, as plaintiff alleges, it was in his individual capacity.

The Trenton Iron Works are liable to be closed unless Cooper, Hewitt & Co., who employ about 1000 men, can make a reduction in the expenses. Mr. Hewitt says: "Either course is very disagreeable to me. But before closing them I shall certainly endeavor to readjust the relations of employers and employees in such a way as to prevent the cessation of a business which for so many years has contributed to the life of the many collateral interests which go to make up the prosperity of a community." A committee of workmen who waited on him a year ago to see about an advance of wages were offered the works by the Mayor, with a sufficient working capital, if they would agree to pay 5 per cent. on the investment. Since then the employees have made no demand for more pay.

A short time since we noted in these columns the fact that the National Tube Works Company, of McKeesport, Pa., the largest concern of their kind in the world, had notified their employees of a 10 per cent. reduction in wages. The proposed reduction was refused by the workmen, and the matter is still unsettled. At the present time the works are running at about half capacity. On the 13th inst. about 600 men employed in the tube department were temporarily suspended, and on the same date the employees of the rolling mill were put on half time, making in all about 2000 men thrown out of employment. The company state that the suspension is due to the dullness in trade, and that at the present rate of wages existing the mills are running at a loss.

The Virginia Iron and Nail Works Company, of Lynchburg, Va., will increase their capital stock from $175,000 to $200,000.

The large blast furnace at Pulaski, Va., recently completed by the Pulaski Iron Company, was successfully blown in on Saturday the 11th inst. The enterprise was established by capitalists of Philadelphia.

Shoenberger & Co., of Pittsburgh, signed the Amalgamated Steel Workers' scale last week. The scale was accepted by the firm as presented, with but few changes. The above scale has now been signed by every firm at Pittsburgh and vicinity to whom it has been presented.

The Paducah Iron Company, of Paducah, Ky., were organized on the 13th inst., with a capital stock of $250,000, and the following officers were elected: President, Thomas Howard, St. Louis; vice-president, W. W. Powell, Paducah; treasurer, Rufus J. Lackland, president Boatman's Banking Company, St. Louis; secretary, Hugh Mulholland; superintendent, Thomas J. Scott. Directors: E. C. Lackland, Thomas Howard; T. J. Scott, St. Louis; G. C. Thompson, M. Bloom, W. W. Powell, Paducah. The company will erect a blast furnace of 200 tons capacity, the citizens of the above place having donated the site for the same. It is expected to be ready to commence operations by September 1st next.

Proceedings were recently commenced in the courts at Columbus, Ohio, to make the stockholders of the Columbus Steel Company, of that city, whose affairs were recently placed in the hands of a receiver, individually liable for the indebtedness of the concern. The suit was filed by P. P. Mast & Co., of Springfield, who hold a claim of $159.75 against the steel company, which they state is in the shape of a note which went to protest. The petition recites the proceedings already taken in the courts resulting in the appointment of Mr. Parrott as receiver, and gives the known stockholders as Messrs. E. L. Hinman, B. S. Brown, William Moneypenny, D. S. Gray, W. W. Franklin, J. M. McCune, W. A. Mahony, Charles Henderson, D. E. Putnum, J. G. Deshler, H. D. Turney, Samuel Thomas and R. E. Neil. Plaintiffs aver that the company's corporate property will not be sufficient to pay the creditors in full, and ask that the courts determine who are equitable owners and who legal owners of the stock, ascertain the liabilities of the company and require the members to contribute *pro rata* toward discharging the same, including reasonable counsel fees for plaintiffs.

A dispatch from Belleville, Ill., under date of the 19th inst., reads as follows: "The Western Nail Mill Company yesterday confessed judgment for $50,000 in favor of the First National Bank and the Belleville Savings Bank. The plant of the Belleville company is estimated to be worth $200,000, but owing to a depression in the market, in consequence of which the mill was unable to run without loss, it has been shut down for several months."

Lewis Colyar, who has been for several years manager of the Chattanooga Furnace and the furnace at Rising Fawn, Ga., tendered his resignation on Wednesday, the 8th inst., and J. W. Hoffman, of Philadelphia, succeeds him. Mr. Colyar resigned to devote himself to the Dowling Furnace, of Chattanooga, and the Gadsden (Ala.) Furnace No. 2, both of which are now being built. Mr. Colyar is president of and a large stockholder in both furnaces.

The Carbon Iron Company, of Pittsburgh, intend to put up in the near future two open-hearth furnaces, and necessary trains of blooming and finishing rolls to manufacture structural steel from the blooms made by the company's own process. This particular process is the manufacture of wrought-iron blooms direct from the ore, where the use of graphite is a reducing and protecting agent, and is known as the Eames direct-process. A member of the firm states that the company have a number of these reducing furnaces now put up, a blooming mill and squeezer, and the plant is producing iron regularly at present from these reducing furnaces, and upon a successful scale, and a very economical rate compared with the puddling process for the manufacture of wrought iron. The stock is peculiarly adapted for making steel by the open-hearth process, and it is for this purpose that the concern is going to adopt it.

The annual meeting of the stockholders of the Pennsylvania Construction Company, of Pittsburgh, manufacturers of architectural iron work, was held at the office of the company on First avenue, in that city, on Monday, the 13th inst. The annual report was submitted and the business showing for the year was very satisfactory. C. S. Seaton, one of the directors who died during the past year, was succeeded by his son, C. H. Seaton. With this change the board of directors is the same as last year. They are: C. Yeager, J. S. Reymer, W. N. Voegtly, J. A. Butz and C. H. Seaton. The company have secured the contract to build the North River pier, No. 62, for the New York Central Railroad, in New York, to cost $26,000. They will also furnish the structural iron and the iron roof for the new building of the Columbus Board of Trade, for a bid of $10,000. The directors will meet in a few weeks to elect officers.

The Lynchburg Iron Company, Lynchburg, Pa., propose during the year to add to their plant at Lynchburg a pipe foundry, with a capacity of 30 tons per day.

The condition of the iron industry in the Shenango Valley, Pa., is reported to be fairly satisfactory. The Stewart Iron Company, Limited, at Sharon, have started up their works to make a special grade of fine guide iron and blooms. One of their blast furnaces is in operation and there is a prospect of the other one resuming at an early date. The Shenango Machine Company, Limited, Daniel Eagan, proprietor, are in constant operation, and are at present turning out mill and fur-

nace castings for Southern shipment. The Atlantic Iron and Nail Works, P. L. Kimberly & Co., proprietors, also at Sharon, are running full in nearly all departments with a number of orders ahead. The blast furnace of the above firm is banked at present on account of a large stock of pig iron on hand. The Sharon Iron Company are making some extensive improvements at their works. A train of 22-inch rolls is being placed in the sheet mill. The foundations under the engine and rolls are being built with hard red brick laid in cement. The blast furnace of this concern is in operation and is making a good record.

The Steel Car-Wheel Company have succeeded to the Boston Car-Wheel Company in the operation of the works at the corner of First and I streets, Boston, Mass. The latter company's interest in the works was largely experimental. The present company intend to bring out an all-steel wheel at a price that will enable it to be economically used under freight cars. This wheel is manufactured under patents of Nathan Washburn, superintendent of the works. Tests of the wheel in actual service and under the drop are said to be quite remarkable. Mr. Willard White is president of the new company, and Mr. Wm. W. Whitcomb is their treasurer and secretary.

Machinery.

On Thursday, the 16th inst., H. K. Porter & Co., of Pittsburgh, manufacturers of light locomotives, whose plant is located at Forty-eighth street and A. V. R. R., made a distribution of a proportion of the profits of the concern for the year ending on December 31, 1887, to their employees, numbering about 440 persons in all. The money was the gift of Mr. H. K. Porter, who has decided to present his workmen every year at the close of business with a fair and a proportionate share of the profits of the establishment. The amounts received varied, some of the boys receiving as low as $2 apiece, while some of the skilled workmen received as high as $300 apiece. Each person sharing in the distribution also received a letter, of which the following is a copy:

PITTSBURGH, PA., February 16, 1888.

It is with great pleasure that we at this time make another distribution of money among the men in our employ. Inclosed we hand you check for ——— payable to your order. We regret that a few of the 440 men in our employ during 1887 have declined any share in this distribution. But the practical unanimity of feeling on the part of our employees, and their hearty co-operation with us in making the business a success, is very gratifying to us. As you grow to understand more fully our earnest desire for the best of feeling and best of action toward each other, we hope for still better results in the future, and that the good accomplished by this feeling may be still more manifest. If we have such co-operation from you that we shall be willing to carry out our present plans, every dollar any one of you saves by more careful work, by greater efficiency, by less waste, or error or blunder is of positive value to every other workman as well as to ourselves. On the other hand, every dollar lost or wasted affects every one of you. The acceptance of this check is a recognition by you of our interest in your personal welfare, which has led us to a large expenditure of money outside of any legal obligation upon us, but from the best of wishes toward you. You thus show your entire, hearty sympathy with us in the conduct of our business, and your determination to do all in your power for the success of the firm, as well as your own success.

We remain your friends,

H. K. PORTER & Co.

Lynch Bros., of Titusville, Pa., boiler manufacturers, are considering the advisability of removing their plant to some other location. When in steady operation they give employment to from 35 to 50 men, and their works are fitted with the latest improved steam-power tools, such as punches, drills, heavy plate shears, beveling machines, rolls and bolt cutters. Their main building is 55 feet wide, 135 feet deep and 18 feet high. Among the numerous large orders they are now engaged in filling is that of six 18-foot long boilers for the United Pipe Line Company. The front or wagon-top of these boilers is 48 inches in diameter, while the back is 40 inches in diameter.

It is stated that large machine shops will shortly be erected at Massillon, Ohio, by some capitalists of that place.

Alfred Box & Co., Philadelphia, advise of the recent shipment of two gangs of radial drills of seven machines, and a number of single orders to the Union Bridge Company, and are also completing a gang of similar machines for the Mount Vernon Bridge Company, Ohio.

The Pennsylvania Railroad Company have just given out orders for 2200 cars, and to the Baldwin Locomotive Works orders for 70 consolidated engines.

Morse, Williams & Co., Morse Elevator Works, Philadelphia, report orders for elevators as follows: Henry Holmes, G. Rebmann & Co., Pennsylvania Company for Insurance on Lives and Granting Annuities, and Schleicher, Schumm & Co., all of Philadelphia; J. B. Pace Tobacco Company, Richmond, Va.; Meriden Cutlery Company, Meriden, Conn.; O. E. Lindsley, Bridgeport, Conn.; Robinson & Cary, St. Paul, Minn., Cambria Iron Company, Johnstown, Pa.; E. McDonald, Erie, Pa.; M. L. Ryder and J. T. Lansing, Albany, N. Y.; Eames Vacuum Brake Company, Watertown, N. Y.; J. B. Sheffield & Son, Saugerties, N. Y.; Jos. Bancroft & Sons, Wilmington, Del.; Hohenstein Mfg. Company, Newark, N. J.; Scranton Supply and Hardware Company, Scranton, Pa.; Pemberton Company, Lawrence, Mass. and Provo Mfg. Company, Provo City, Utah.

Miscellaneous.

Among the new companies recently incorporated in Illinois are the following: Chicago Fuel Company, of Chicago; capital stock, $5,250,000; to supply gas for light and fuel; incorporators, Charles W. Colehour, A. P. Pierce and David C. McVean. The Geo. H. Hess Company, of Chicago; capital, $125,000; to manufacture and deal in stoves, furnaces, &c.; incorporators, Geo. H. Hess, Geo. H. Hess, Jr. and Chas. Pope. The Minnesota Dock Company, at Chicago; capital stock, $80,000; to manufacture pig iron; incorporators, Foster H. Cardwell, Arthur C. Ely and Austyn W. Granville. Lawther Mfg. Company, at Chicago; capital stock, $75,000, to manufacture all kinds of machinery, &c.; incorporators, Alfred Lawther, Andrew C. Lauston and P. C. Hanford. The West Chicago Rapid Transit Company, capital stock, $6,000,000; object, to construct, maintain, lease or acquire and operate elevated railways in Chicago; incorporators, John D. Jennings, E. Nelson Blake and Abnor M. Wright. The Bates Machine Company, at Joliet; capital stock, $20,000; incorporators, Robert J. Bates, W. O. Bates and J. Winterbothem. The John W. Page Company, at Chicago; capital stock, $10,000; to manufacture steam and water boilers; incorporators, John W. Page, John Woodman and L. S. Hodges. The Fuel Gas Company, of Joliet; capital stock, $50,000; incorporators, H. S. Smith, A. J. Hawk and J. Burnett. The Banks Agriculture and Transfer Company, at Chicago; capital stock, $10,000; to manufacture hardware; incorporators, James A. Peoples, John C. Banks and A. H. Bridges. The same incorporators—namely, Lewis B. Hillis, A. I. Flanningham and J. W. Paddock—are named for the following companies, all located at Chicago: The Portage Iron Company, capital, $100,000; the Buena Vista Iron Company, capital, $50,000; the Surry Iron Company, capital, $25,000; the Custer Iron Company, capital, $50,000; the Amherst Iron Company, capital, $25,000. The Dauchy Iron Works, at Chicago; capital stock, $20,000; incorporators, George K. Dauchy, L. O. Dauchy and C. H. Ross. The Lomax Mfg. Company, at Lomax, Henderson County; to manufacture road graders, wagons, &c.; capital stock, $12,000; incorporators, R. A. Lomax, R. W. Allsup and J. H. Holland.

A press dispatch from Dubuque, Iowa, states that the Iowa Iron Works Company, of that city, have taken an order for the construction of a steel steamboat, which it is said, will be the first one ever built for use on the Upper Mississippi. The boat will be 220 feet long, 34-foot beam, and 5½-foot hold, and will cost $50,000. All its appointments will be first class, and it is proposed to make the trip from St. Louis to St. Paul in half the time consumed by the slow packet wooden steamers. Work will begin on the boat at once. It will be built for St. Louis capitalists.

Hardware.

Kieckhefer Bros. & Co., proprietors of the Milwaukee Stamping Works, of Milwaukee, Wis., have broken ground for a new factory, which is to have double the capacity of the old works. The new factory will be located between Ninth and Tenth streets, fronting on Fowler street, and extending along the Milwaukee River, covering a whole block. The Fowler street front will be 315 feet long. The dimensions of some of the principal buildings are as follows: Storage-room No. 1, 60 x 200 feet, five stories high; storage-room No. 2, 50 x 100 feet, two stories high; sheet-iron room, 75 x 100 feet, two stories high; main factory, 50 x 265 feet, five stories high: tinning and galvanizing departments combined, 50 x 150 feet. The buildings will be constructed entirely of brick. Japanning and galvanizing departments are to be added to the present departments, enabling the firm to manufacture all their own goods and completely finish them. Their line will consist of stamped ware, pieced tinware, sheet-iron ware of every description and galvanized ware. Having their own machine shops, they are now making much of their own machinery of special designs for the new factory. They expect to have it in operation by the 1st of next December.

It is stated that the Illinois Wire Company are making arrangements for building a barb-wire factory, adjacent to their draw-wire mills in East St. Louis. It is expected that the output will not be less than 40 tons per day.

The Skillman Hardware Mfg. Company, Trenton, N. J., are reported to have been incorporated with a capital stock of $25,000. Edward V. D. Skillman and others, incorporators.

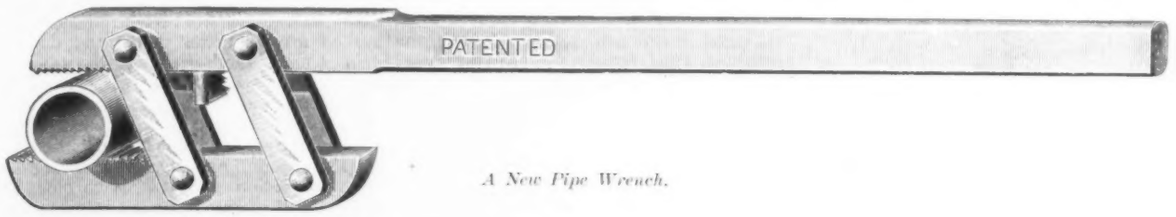
The White Mountain Freezer Company, Nashua, N. H., are at present employing 160 to 175 workmen, and will increase this number to 200 about March 1. The monthly payroll is about $8000 to $10,000.

The Newark, Ohio, Wire Nail Company, manufacturers of brass and copper wire cloth, Newark, Ohio, have not yet resumed work, as the new brick factory to replace the one burned last November is not yet finished. By March 1, however, they expect to have a few looms working.

The old ship Victory, Nelson's flagship off Cape Trafalgar, when he encountered and beat the combined French and Spanish fleet, October 21, 1805, was recently found to be in a sinking condition, but has been saved, and now, after weathering the storms of a century, rides at anchor in Portsmouth harbor. A plate fastened to her quarter-deck marks the spot where the great admiral, shot through the body by a musket ball, survived only long enough to see the enemy strike his colors.

A New Pipe Wrench.

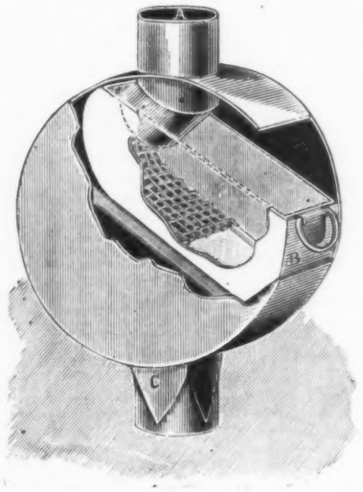
The Ellrich Hardware Mfg. Co., Plantsville, Conn., are putting on the market a new pipe wrench, which is represented in the accompanying cut. This wrench is described as made of the best tool steel, its construction being clearly indicated in the engraving, as well as the manner in which it lays hold of the pipe. The points which are made in regard to it are: Its great simplicity; the fact that it is self-adjusting; the firmness of its grip; that in working up against the side of a partition or in the corner, it has advantages over other wrenches, and that it cannot get out of order. It is to be made in the following sizes: The smallest for pipe up to ½-inch, other sizes for pipe from ½ to 1 inch; from 1 inch to 2 inch, and from 2 inch to 3 inch.



A New Pipe Wrench.

New Filtering Joint.

The accompanying engraving illustrates an improvement in the rain-water cut-off and filtering joint manufactured by

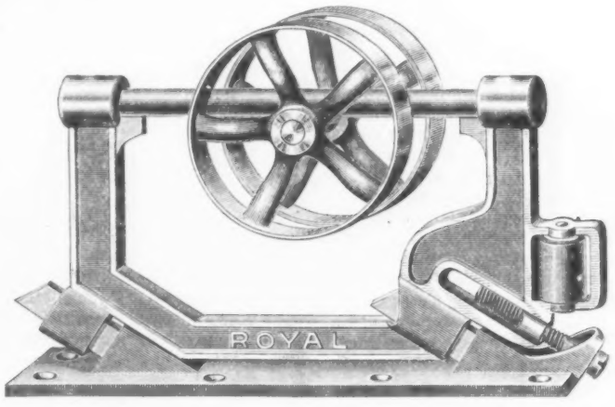


Lee's New Filtering Joint.

Thomas Lee, who is located on Race street, Cincinnati, which has been recently patented. As will be seen by reference to the engraving, the device embodies a strainer for the water, the latter flowing through the pipe under pressure. The article consists of a cylinder as large or slightly larger between the heads than the diameter of the pipes, and having upon its upper front side an opening and on the inside two guide-ways. The rear ends of the latter are higher than their forward ends. On these guides there is placed a removable drawer clearly shown in the engraving. This has a wire cloth bottom. Directly above and at the rear end of the drawer a coarse wire mesh is placed. The supply pipe entering from above is inclined rearwardly within the cylinder so that it projects at a right-angle to the slant of the drawer. The discharge pipe passes out through the lower side of the drum on a direct line with the supply pipe. Referring to the engraving, A represents the supply pipe, B the removable drawer, and C the discharge pipe. The drum of the filtering joint is composed of two disks secured to a band or ring and placed a short distance apart. The space between the two disks is made equal to or slightly in excess of the diameter of the pipes. The removable drawer fits snugly between the drum-heads. The rear end of it is curved, while the front end is made at an angle, so that when it is placed in the opening and pushed back in the drum it moves up the inclined guide-ways until the rear end comes in contact with the opposite side of the drum-ring. In this position it is firmly held in place. The rear half of the drawer has, at a short distance above the bottom, a coarse wire cloth, the back end of which is attached to the upper end of the drawer, from which point it extends downwardly in curved form, agreeing, approximately, with the curve of the gauze bottom beneath it. From this description it will be seen that the bottom is approximately at right angles to the direction of the supply pipe within the drum, and that the whole volume of water from the supply pipe strikes first the coarse wire cloth and then passes through the gauze bottom at the extreme back end. This arrangement and the force of the water against the back end of the drum washes forward the dirt, so that the strainer remains at all times unobstructed. This permits the free flow of the water. The manufacturer lays particular stress upon the fact that the strainer, as shown and described, without any modification, may be used on a horizontal pipe to strain water which flows through a pipe under pressure or otherwise.

The Royal Sliding Door Hanger.

The Royal, of which an illustration is herewith given, is a new sliding door hanger recently placed on the market by E. C. Stearns & Co., Syracuse, N. Y.

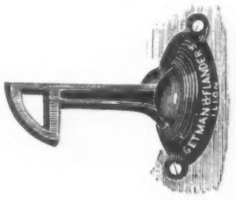


The Royal Sliding Door Hanger.

It belongs, it will be observed, to the class of anti-friction or rider-bar hangers. In regard to it the following points are made: The wheels have no flanges which would be liable to cut and wear the wood track, but are made with a broad, flat face; the axles and rider bar are constructed of round steel; the pins whereon the hanger slides, which permit perpendicular adjustment, are of flat steel, allowing a reduction in width of casing to a minimum; and it is secured by screws to the top edge of the door, which dispenses with any cutting or fitting in order to accommodate the adjusting screw. With this addition, the trade will note the completeness of the assortment of hangers made by these manufacturers.

Barn Door Check.

The illustration given below represents a door check manufactured by the Phillips-Getman Company, Ilion, N. Y. It is intended to hold open stable and barn doors. The catch is held in position by a spring in the base. Its operation will be readily understood, as the door striking against the curved portion of the catch forces it back, when by the action of the spring the catch engages the door and holds it



Barn Door Check.

open until released. This door check can be placed at the top, bottom or side of doors, and will operate on doors ½ to 3 inches thick. The company allude to its utility in preventing the breaking of hinges on swinging doors and its convenience in holding a barn door open.

Mr. W. F. Jarvis, of the firm of Charles Himrod & Co., Detroit and Chicago, Mr. J. B. Dyar, of Detroit Metal and Heating Works, of Detroit, and Hon. James McMillan, capitalist, of Detroit, have formed a stock company to be known as Michigan Radiator and Iron Mfg. Company. This company hope to be in active operation in Detroit by July 1st. The connection of Mr. Jarvis with this concern will in no manner interfere with the interests of Charles Himrod & Co. in their pig iron business, which will be continued in Detroit under Mr. Jarvis's management, as formerly.

Liquid Glue.

The accompanying illustration represents a new can in which Le Page's Liquid Glue and Cement Company, Gloucester, Mass., are putting up their glue. As indicated in the cut, the brush is attached to the screw top, through which it passes, and is fastened to the handle or lever

A New Can for Glue.

above. The advantages of this construction are that a form of handle is given of which a firm grasp can be taken; that the brush is always at hand ready for use, while at the same time the can, when the glue is not in use, is tightly covered, so that the glue remains in good condition. The attractiveness of the appearance of the can is also alluded to, being finished in blue and gold lacquer.

Windmills for Generating Electricity.

In an article on the above subject in the *Stevens Indicator* Mr. A. B. Wolff remarks:

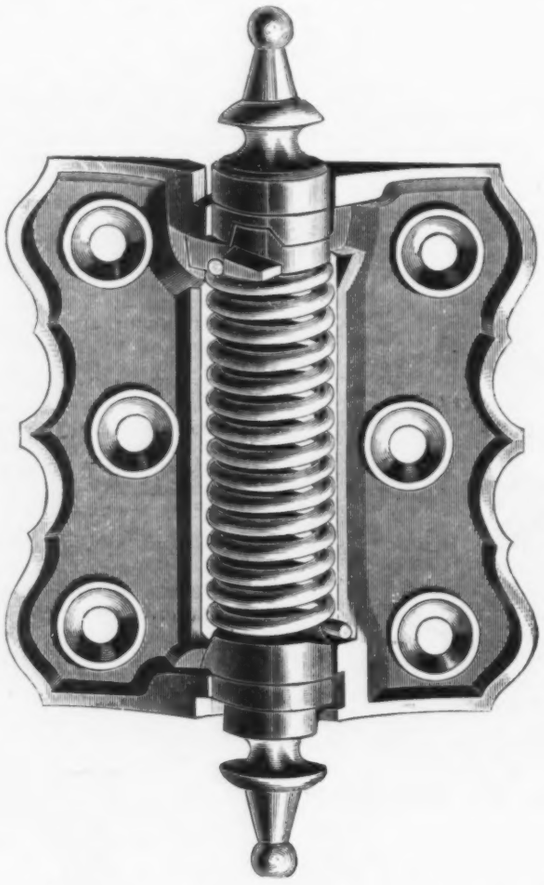
"It is safe to maintain that the reason windmills have not thus far been put to practical use for the generation of electricity is not due to the first cost of the motor nor to any lack of economy in operation. I here wish to emphasize the fact that the non-employment of the windmill in this connection is also not owing to the often alleged fact that the rate of revolution of the windmill, according to varying force of the wind, is too irregular to run a dynamo for the purpose of charging a storage battery, or that the wind cannot be depended on for a sufficient length of time per day. The real facts of the case are that in the leading American windmills, as is attested by hundreds of thousands in daily use in pumping practice, governing appliances of various kinds, of approved design and experience, automatically so vary the extent of surface presented to the wind that a practically uniform rate of revolution is obtained, irrespective of direction and varying velocities of wind, for all winds exceeding a velocity of six miles per hour. This latter velocity must be reached before windmills of good design, as ordinarily constructed, operate at the rate of revolution for which they are set. It has been found by experience that on an average for at least eight hours out of the twenty-four hours of each day the wind exceeds this velocity of six miles per hour, the average velocity of wind during the eight hours of run being 16 miles per hour. Total calms in excess of two days' duration are practically unknown in the United States.

"The fact that the windmill is at rest often at short intervals, aggregating not quite 16 hours out of the 24, is no objection to the use of this motor for the purposes of driving dynamo machines to charge electrical accumulators, for one of the very features and acknowledged requisites of such accumulators should be that they can be charged spasmodically, at will and at odd times. The result of study of this question must be that the reason windmills are not used in this way is not that the windmills are not sufficiently economical or reliable, but that the electrical accumulators are not yet a satisfactory and assured success. When they are, windmills will come into extended use as prime movers for the generation of electricity, and electricians will be glad to avail themselves of the most economical motor, utilizing the force of wind, otherwise going to waste, for this purpose. The windmill at the present day is, in a developed state, a practical success, ready and available for this new use at once. It awaits the electrical accumulator that is a thorough, practical success."

Mr. Wolff's doubt of the capacity of the storage battery of the present day is, we think, in a great measure justified by facts. Electric accumulators are brought out every now and then for which extravagant claims are made in point of efficiency, but which practically seem to leave very much to be desired.

New Spring Hinge.

The Stover Mfg. Company, Freeport, Ill., are manufacturing a line of spring hinges, one of which, their Ideal Lock-Back Spring Hinge, is represented in the accompanying illustration. This hinge is described as so constructed that it will close the door readily and hold it closed, while by throwing the door wide open the hinge will lock and hold it in that position, a slight pull only being necessary to unlock it, when the action of the spring will again close the door. The point is made that other hold-back spring hinges are so arranged that when the door is swung open about half way the action of the spring reverses, throwing the door wide open and holding it thus, the door thus being frequently fastened open, especially by children, when not intended. In this hinge, however, the spring has but one action and that is to close the door at all points, except when carried wide open, at which point it is held. It is also mentioned by the company that the hinge is much heavier and stronger than other makes which sell at the same price to the trade, and that the coiled spring is larger and has more coils, rendering it efficient and durable. The simplicity of the spring is also referred to, as it has but three parts and two points of bearing, thus greatly reducing the friction and adding to the life and efficiency of the spring.



Ideal Lock-Back Spring Hinge.

An order, which has been recognized as largely in the interests of the traveling public as of the railway employees benefited under it, has been issued by the authorities of the Great Northern Railway, England, to the effect that the engineers and firemen of the company are not to be allowed to resume duty without an interval of nine hours' rest.

The Newport Iron and Steel Company, Newport, Ky., have issued a handsome calendar.

The price paid for Alaska was $7,000,000. The Alaska Commercial Company have already paid into the United States treasury about $5,000,000 in seal rents for the islands of St. Paul and St. George, and the production of the Territory last year is officially stated to have been in furs, $2,500,000; gold, $1,350,000; fish, $3,000,000; lumber, &c., $100,000; total, $6,950,000.

CURRENT HARDWARE PRICES.

FEBRUARY 22, 1888.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures named.

Ammunition.

Caps, Percussion, ₩ 1000—
Dicks & Goldmark's
F. L. Waterproof, 1-10's ..... 50¢ } dis 25@
E. B. Trimmed Edge, 1-10's ..... 65¢ } 25&
E. B. Ground Edge, Central Fire, 1-10's. 70¢ } 7½ %
Double Waterproof, 1-10's ..... $1.40 }
Musket Waterproof, 1-10's ..... 52¢ @ 53¢
G. D ..... 28¢
S. B ..... 30¢
Union Metallic Cartridge Co.
F. C. Trimmed ..... 50¢ }
F. L. Ground ..... 65¢ } dis 25@
Cen. Fire Ground ..... 70¢ } 25&
Double Waterproof ..... $1.40 } 7½ %
Double Waterproof, in 1-10's ..... $1.40 }
S. B. Genuine Imported ..... 45¢
Eley's E. B ..... 54¢ @ 56¢
Eley's D Waterproof, Central Fire $1.60

Cartridges—
Rim Fire Cartridges ..... dis 50&5&2 %
Rim Fire Military Cartridges ..... dis 15&2 %
Cen. Fire Cartridges, Pistol and Rifle ... dis 25&5&2 %
Cen. Fire Cartr., Military & Sporting ... dis 15&5&2 %
Blank Cartridges, except 22 and 32 cal., an additional 10 % over above discounts.
Blank Cartridges .22 cal ..... $1.75, dis 2 %
Blank Cartridges, 32 cal ..... $3.50, dis 2 %
Primed Shells and Bullets ..... dis 15&5&2 %
B. B. Caps, Round Ball ..... $1.75, dis 2 %
B. B. Caps, Conical Ball, Swaged ..... $2.00, dis 2 %

Primers—
Berdan Primers all sizes, and B. L. Caps (for Sturtevant Shells) ..... $1.00, dis 2 %
All other Primers, all sizes ..... $1.20 dis 2 %

Shells—
First quality, 4, 8, 10 and 12 gauge ... dis 25&10&2 %
First quality, 14, 16 and 20 gauge ($10 list), dis 30&10&2 %
Star, Club, Rival and Climax Brands, } 10-gauge, $9 list } dis 33⅓&10
{ 12-gauge, $8 list } 2 %
Club, Rival and Climax Brands, 14, 16 and 20 gauge ..... dis 30&10&2 %
Selbold's Combination Shot Shells ..... dis 15&2 %
Brass Shot Shells, 1st quality ..... dis 60&2 %
Brass Shot Shells, Club, Rival & Climax ... dis 65&2 %

Shells Loaded—
List No. 19, 1887 ..... dis 20 & 10 %

Wads—
U. M. C. & W. R. A.—B. E., 11 up ... $2.00 }
U. M. C. & W. R. A.—B. E., 9&10 ... 2.30 }
U. M. C. & W. R. A.—E. E., 7&8 ... 2.60 } dis 20&2 %
U. M. C. & W. R. A.—P. E., 11 up ... 3.10 }
U. M. C. & W. R. A.—P. E., 9&10 ... 4.00 }
U. M. C. & W. R. A.—P. E., 7&8 ... 4.90 }
Eley's B. E., 11 up $1.75
Eley's P. E., 11 @ 20 ..... $2.80

Anvils.—Eagle Anvils.... ₩ ℔ 10¢, dis 20 @ 20&5 %
Wright's ..... 9½¢
Armitage's Mouse Hole ..... 9¢
Armitage Mouse Hole, Extra ..... 11½¢
Trenton ..... 9½¢@9½¢
Wilkinson's ..... 9½¢@10¢
J. & Riley Carr. Patent Solid ..... 11@11½¢

Anvil Vise and Drill—
Millers Falls Co ..... $18.00, dis 20 %
Chenev Anvil and Vise ..... dis 25 %
Allen Combined Anvil and Vise ..... $3, dis 40&10 %
Moore & Barnes Mfg. Co ..... dis 33⅓ %

Augers and Bits.

Douglass Mfg. Co }
New Haven Copper Co. }
Wm. A. Ives & Co. } ... dis 70@70&5 %
Humphreysville Mfg. Co. }
French, Swift & Co. (P. H. Beecher) }
Connecticut Valley Mfg. Co ..... }
Cook's, Douglass Mfg. Co ..... dis 55 %
Cook's, New Haven Copper Co... dis 50&10@50&10&5 %
Ives' Circular Lip ..... dis 60 %
Patent Solid Head ..... dis 30 %
C. E. Jennings & Co., No. 10, extension l'p ..... dis 40 %
C. E. Jennings & Co., No. 30 ..... dis 60 %
C. E. Jennings & Co., Auger Bits, in fancy boxes, ₩ set, 32½ quarters, No 5, $5; No. 3C, $ ..... dis 20 %
Lewis' Patent Single Twist ..... dis 45 %
Russell Jennings' Augers and Bits ..... dis 25 %
Imitation Jennings' Bits (new list) ..... dis 60@6 ?&5 %
Pugh's Black ..... dis 20 %
Car Bits ..... dis 50&10@60 %
L'Hommedieu Car Bits ..... dis 15&10 %
Forstner Pat. Auger Bits ..... dis 10 %

Hollow Augers—
Ives } dis 25&10 @
French, Swift & Co. } 25&10&5 %
Douglass' }
Bonney's Adjustable ₩ doz. $48 ..... dis 40&10 %
Stearns' ..... dis 20&10 %
Ives' Expansive, each $4.50 ..... dis 50&10 %
Universal Expansive, each $4.50 ..... dis 20 %
Wood's ..... dis 25 @ 25&10 %

Expansive Bits—
Clark's small, $18; large, $26 ..... dis 35 @ 35&5 %
Ives' No. 4, per doz., $60 ..... dis 35 @ 40 %
Swan's ..... dis 40 %
Steer's, No. 1, $26; No. 2, $22 ..... dis 35 %
Stearns' No. 2, $48 ..... dis 20 %

Gimlet Bits—
Common ..... ₩ gross $2.75 @ $3.25
Diamond ..... ₩ doz. $1.10, dis 25&10 %
"Bee" ..... dis 25 @ 25&5 %
Double Cut, Shepardson's ..... dis 45 @ 45&5 %
Double Cut, Ct. Valley Mfg. Co ..... dis 30&10 %
Double Cut, Hartwell's, ₩ gro. $5.25
Double Cut, Douglass' ..... dis 40&10 %
Double Cut, Ives' ..... dis 60 @ 60&5 %

Bit Stock Drills—
Morse Twist Drills ..... dis 50&10&5 %
Standard ..... dis 50&10&5 %
Cleveland ..... dis 50&10&5 %
Syracuse, for metal ..... dis 50&10&5 %
Syracuse, for wood (wood list) ..... dis 30 @ 30&5 %
Williams' or Holt's, for metal ..... dis 50&10&10 %
Williams' or Holt's, for wood ..... dis 40&10 %

Ship Augers and Bits—
L'Hommedieu's ..... dis 15&10 %
Watrous's ..... dis 15&10 %
Snell's ..... dis 15&10 %
Snell's Ship Auger Pattern Car Bits ..... dis 15&10 %

Awl Hafts.

Sewing, Brass Ferrule ..... $3.50 ₩ gross—dis 45&10 %
Patent Sewing, Short ..... $1.00 ₩ doz—dis 40&10 %
Patent Sewing, Long ..... $1.20 ₩ doz.—net
Patent Peg, Plain Top ..... $10.00 ₩ gross—dis 45&10 %
Patent Peg, Leather Top ..... $12.00 ₩ gross—dis 45&10 %

Awls, Brad Sets, &

Awls, Sewing, Common ..... ₩ gross $1.70—dis 35 %
Awls, Shouldered Peg ..... ₩ gross $2.45—dis 40@40&10 %
Awls, Patent Peg ..... ₩ gross 63¢—dis 40@40&10 %
Awls, Shouldered Brad ..... $2.70 ₩ gross—dis 35 %
Awls, Handled Brad ..... $7.50 ₩ gross—dis 45 %
Awls, Handled Scratch ..... $7.50 ₩ gross—dis 35&10 %
Awls, Socket Scratch ..... $1.50 ₩ doz—dis 25 @ 30 %

Awl and Tool Sets.

Aiken's Sets, Awls & Tools, No. 20, ₩ doz. $10—dis 50&10 %
Gray's Ad Tool Hdls., Nos. 1, $12; 2, $18.; 3, $12; 4, $9. dis 25&25&10 %
Miller's Falls Adj. Tool Hdls., Nos. 1, $12; 2, $18, dis 25 %
Henry's Combination Haft ..... ₩ doz. $6
Brad Sets, No. 42, $10.50, No. 43, $12.50 ... dis 70&10&5 %
Brad Sets, Stanley's Excelsior, No. 1, $7.50. }
Brad Sets, Stanley's Excelsior, No. 2, $4.00. } dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 3, $5.50. }

Axes.

Makers' and Special Brands—
First quality ..... ₩ doz, $6.25 @ $6.50
Others ..... ₩ doz, $5.75

Axle Grease.

Fraser's, in bulk ..... Keg ₩ ℔, 4¢; Pail, ₩ ℔, 5¢ net
Frasers, in boxes ..... ₩ gross $9.50
Dixon's Everlasting, in bxs., ₩ doz., 1 ℔: $1.20; 2 ℔, $2
Dixon's Everlasting ..... 10-℔ pails, each, 85¢
Lower grades, special brands ..... ₩ gro $5.50 @ $7

Axles.—No. 1, 4¢ @ 4½¢; No. 2, 5¼ @ 5½¢.

Nos. 7 to 18 ..... dis 40&10 @ 50 %
Nos. 19 to 22 ..... dis 60&10 @ 60&10&10 %
National Wrought Steel Tubular Self-Oiling:
Standard Farm (1 to 5) and Special Farm (A1 to A5)
Less than 10 sets ..... dis 33⅓ %
Over 10 sets ..... dis 33⅓&5 %
X Strong Exp. (6 to 9), & XX Strong Truck (10 to 16):
Less than 10 sets ..... dis 10 %
Over 10 sets ..... dis 10&5 %

Bag Holders.

Sprengle's Pat., ₩ doz $18. ..... dis 60 %

Balances.—Spring Balances.

Common 24 ..... ₩ doz., $1.50—dis 50 %
Chatillon's Spring Balances ..... dis 50 %
Chatillon's Circular Spring Balances ..... dis 60 %

Bells.

Hand—
Light Brass ..... dis 70&10 %
Extra Heavy ..... dis 60&10 %
White Metal ..... dis 60&10&10 %
Silver Chime ..... dis 25&10&5 %
Globe (Cone's Patent) ..... dis 25&10 @ 35 %

Door—
Gong, Abbe's ..... dis 25&10 @ 35 %
Gong, Yankee ..... dis 40&10 %
Gong, Barton's ..... dis 40&10 @ 50 %
Crank, Taylor's ..... dis 25&10 %
Crank, Brooks' ..... dis 50&10&2 %
Crank, Cone's ..... dis 10 %
Crank Connel's ..... dis 20&10 %
Lever, Sargent's ..... dis 60&10 %
Lever, Taylor's Bronzed or Plated ..... net
Lever, Taylor's Japanned ..... dis 25&10 %
Lever, R. E. ₩ Co.'s ..... dis 50&10&2 %
Pull, Brook's ..... dis 50&10&2 %
Pull, Western ..... dis 25&10 %

Cow—
Common Wrought ..... dis 60&10 %
Western ..... dis 20&10 %
Western, Sargent's list ..... dis 70&10 %
Kentucky "Star" ..... dis 20&10 %
Kentucky, Sargent's list ..... dis 70&10 %
Dodge, Genuine Kentucky, new list .dis 70&70&10 %
Texas Star ..... dis 50&10 @ 50&10&5 %
Tall ..... dis 40&40&5 %
Farm Bells ..... ₩ ℔, 2¾¢ @ 3¢
Steel Alloy Church and School Bells ..... dis 40 %

Bellows.—Blacksmiths'.....dis 60&10&5 @ 60 %

Moulders' ..... dis 40&10 @ 50 %
Hand Bellows ..... dis 4 &10 @ 10 %

Belting, Rubber.

Common Standard ..... dis 75 %
Standard ..... dis 70&5 %
Extra ..... dis 60&10 %
N. Y. B. & P. Co., Standard ..... dis 60&5&5 %
N.Y.B.&P Co., Extra Standard ..... dis 50&10&5 %

Bench Stops.

Morrill's ..... ₩ doz $9—dis 50 %
Hotchkiss's ..... ₩ doz $5.00—dis 10 @ 10&10 %
Weston's, per doz No. 1, $10; No. 2, $9 ... dis 25&10&5 %
McGill's ..... ₩ doz $3—dis 10 %

Bits.—Auger, Gimlet Bit Stock, Drills, &c., see Augers and Bits.

Bit Holders.

Extension, Barber's ..... ₩ doz $15.00—dis 40 @ 40&10 %
Extension, Ives' ..... ₩ doz $20.00—dis 60&5 @ 60&10 %
Diagonal ..... ₩ doz $24.00—dis 40 %
Angular ..... ₩ doz $24.00—dis 40&5 %

Blind Adjusters.

Domestic ..... ₩ per doz $3.00—dis 33⅓ %
Excelsior ..... ₩ doz $10.00—dis 50&10&2 %
Washburn's Self-Locking ..... dis 20 @ 20&10 %

Blind Fasteners.

Mackrell's ..... ₩ doz pairs, $1.00—dis 20@20&10 %
Van Sand's Screw Pattern ..... $15 ₩ gro.—dis 60&10 %
Van Sand's Old Pattern ..... $15 ₩ gro.—dis 55&10 %
Washburn's Old Pattern ..... $9 ₩ gro. net
Merriman's ..... new list, net
Austin & Eddy No. 2008 ..... $9 ₩ gro. net
Security Gravity ..... $9 ₩ gro. net

Blind Staples.

Barbed, ⅛ in. and larger ..... ₩ ℔ 8 @ 8½¢ net
Barbed, ⅜ in ..... ₩ ℔ 9 @ 9½¢ net

Blocks.

Ordinary Tackle, list April 17, '85 ..... dis 40 %
Cleveland Block Co., Mal. Iron ..... dis 50 %

Bolts.

Door and Shutter—
Cast Iron Barrel, Square, &c ..... dis 70 @ 70&10 %
Cast Iron Shutter Bolts ..... dis 70 @ 70&10 %
Cast Iron Chain (Sargent's list) ..... dis 65&10 %
Ives' Patent Door Bolts ..... dis 55 %
Wrought Barrel ..... dis 70 @ 70&10 %
Wrought Square ..... dis 70 @ 70&10 %
Wr't Shutter, all Iron, Stanley's list ..... dis 60&10 %
Wr't Shutter, Brass Knob, Stanley's ..... dis 40&10 %
Wrought Shutter, Sargent's list ..... dis 60&10 %
Wrought Sunk Flush, Sargent's list ..... dis 55&10 %
Wrought Sunk Flush, Stanley's list ..... dis 40&10&5 %
Wrought B.K. Flush, Com'n Stanley's list. dis 55&10 %

Carriage—
Com. list June 10, '84 ..... dis 70&10&3 %
Genuine Eagle, list Oct., '84 ..... dis 75 @ 75&5 %
Phila. pattern, list Oct. 7, 84 ... dis 75&10@75&10&5 %
R. B. & W., old list ..... dis 70 %

Tire—
Common, list Feb. 28, 1883 ..... dis 65&10 %
P. C. B. & N. Co., Empire, list Feb. 28, 1883. dis 65&10 %
P. C. B. & N. Co., Philadel., list Oct. 84. ... dis 82½ %
P.C.B.&N.Co., Keystone, Phil. list, Oct. '84 ..... dis 80 %
P.C.B.&N.Co., Norway, Phil. list, Oct. '84. dis 75&10 %
Am. S. Co., Norway, Phil., list Oct. 16, '84 .. dis 75&10 %
Am. S. Co., Eagle, Phil., list Oct. 16, '84 ..... dis 80 %
Am. S. Co., Philadel. list, Oct. 16, 84 ..... dis 82½ %
Am. S. Co., Bay State, list Feb. 28, '83 ..... dis 65&10 %
R. B. & W., Philadel. list Oct. 16, 1884 ..... dis 82 %
R. & E. Mfg. Co ..... dis 65 %

Stove and Plow—
Stove ..... dis 62½ %
Plow ..... dis 60&5 %
Am. S. Co. Stove, Annealed ..... dis 62½ %
R. B. & W., Plow ..... dis 55 %
R. B. & W., Stove ..... dis 62½ %
R. & E. Mfg. Co., Stove ..... dis 62½ %
Machine ..... dis 75@75&5 %
Bolt Ends ..... dis 75&75&5 %

Borax ..... ₩ ℔ 9½@10¼¢

Boring Machines.

Without Augers.	Upright.	Angular.
Douglass	$5.50	$6.75.....dis 50 %
Snell's, Rice's Patent	5.50	6.75.dis 40&10&10 %
Jennings	5.50	6.75.dis45@45&10¢
Other Machines	2.35	2.75. ..... net
Phillips' Pat., with Augers	7.00	7.50. ..... net

Bow Pins

Humason, Beckley & Co.'s ..... dis 60&10 %
Sargent & Co.'s ..... $17 and $18, dis 50&10 %
Peck, Stow & W. Co ..... dis 50&10 @ 50&10&5 %

Braces.

Backus, Nos. 110 to 114 and 31 to 33.. dis 60&5@60&10%
Backus, Nos. 6, 8, 12, 14 ..... dis 60&10&5 %
Backus, Nos. 16, 18, 20, 29, 7 .9, 11 ..... dis 70&10&5 %
Barber's, Nos. 10 to 16 ..... dis 50 %
Barber's, Nos. 30 to 33 ..... dis 50 %
Barber's, Nos. 40 to 63 ..... dis 50&10 %
Barker's, Nos. 8, 10 and 12 ..... dis 75&10@80 %
Barker's, Plated, Nos. 8, 10 and 12 ..... dis 65&10@70 %
Osgood's Ratchet ..... dis 40&10@50 %
Spofford's ..... dis 50&10 %
Ives' New Haven Novelty ..... dis 70 @ 70&5 %
Ives' New Haven Ratchet ..... dis 6..&5 @ 60&10 %
Ives' Barber Ratchet ..... dis 60&5 @ 60&10 %
Ives' Barbers ..... dis 60&5 @ 60&10 %
Ives' Spofford ..... dis 60&5 @ 60&10 %
Common Ball, American ..... $1.10 @ $1.15
Bartholomew's, Nos. 25, 27, 30 ..... dis 50&10@60&5 %
Bartholomew's, Nos. 117 118 119 ..... dis 70 @ 70&5 %
Amidon's Barker's Imp'd Plain ..... dis 75&10 @ 80 %
Amidon's Barker's Imp. Nickeled ..... dis 65&10 @ 70 %
Amidon's Ratchet ..... dis 75&10 @ 80 %
Amidon's Eclipse Ratchet ..... dis 60 %
Amidon's Globe Jawed ..... dis 40&40&10 %
Amidon's Corner Brace ..... dis 40 @ 40&10 %
Amidon's Universal ..... 8 in., $2.10; 10 in., $2.25
Amidon's Buffalo Ball ..... $1.10 @ $1.15
P. S. & W ..... dis 50&10 %

Brackets.

Shelf, plain, Sargent's list ..... dis 55&10 @ 55&10&10 %
Shelf, fancy, Sargent's list ..... dis 60&10 @ 60&10&10 %
Reading, plain ..... dis 60&10 @ 60&10&5 %
Reading, Rosette ..... dis 60&10 @ 60&10&10 %

Bright Wire Goods.—..... dis 75&10&10@—%

Broilers.	Inch.	9	10	9 x 11
Henis' Self-Basting..	Per doz.	$4.50	5.50	6.50

Buckets.—See Well Buckets and Pails.

Bull Rings.—Union Co. Nut ..... dis 55 %

Sargent's ..... dis 66⅔&10 @ 70&5 %
Hotchkiss' low list ..... dis 30 %
Humason, Beckley & Co.'s ..... dis 70 @ 70&10 %
Peck, Stow & W. Co.'s ..... dis 60&10 @ 50&10&10 %
Elirich Hdw. Co., White Metal, low list. dis 50@50&10 %

Butcher's Cleavers.

Bradley's ..... dis 25 @ 30 %
L. & I. J. White ..... dis 20&5 f
Beatty's ..... dis 40 @ 40&5%

1	2	3	4	5	6	7	8
$16.50	19.00	21.50	24.00	27.00	30.00	33.50	36.50

New Haven Edge Tool Co.'s ..... dis 40 %

Butts.

Brass—
Wrought Brass ..... dis 70&5 @ 75 %
Cast Brass, Tiebout's ..... dis 33⅓ %
Cast Brass, Corbin's Fast.. dis 33⅓&10@33⅓&10&10 %
Cast Brass, Loose Joint.... dis 33⅓&10@33⅓&10&10 %

Cast Iron—
Fast Joint, Narrow ..... dis 50&10 %
Fast Joint, Broad ..... dis 55&10 %
Loose Joint }
Loose Joint, Japanned }
Loose Joint, Jap. with Acorns }
Parliament Butts } dis 66⅔&10 %
Mayer's Hinges }
Loose Pin, Acorns }
Loose Pin, Acorns, Japanned }
Loose Pin, Acorns, Jap, Plcd. Tips }

Wrought (Steel)—
Fast Joint Narrow ..... dis 65&10@70 %
Fast Joint, Lt. Narrow ..... dis 65&10@70 %
Fast Joint, Broad ..... dis 65&10@70 %
Loose Joint, Broad ..... dis 65&10@70&5 %
Table Butts, Back Flaps, &c ..... dis 65&10@70 %
Inside Blind, Regular ..... dis 65&10@70 %
Inside Blind, Light ..... dis 65&10@70 %
Loose Pin, Wr't ..... dis 65&10@70&5 %
Loose Pin, Light ..... dis 65&10@70&5 %
Bronzed Wrought Butts ..... dis 40@40&10 %

Calipers.—See Compasses.

Can Openers.

Messenger's Comet ..... ₩ doz $3.00, dis 25 %
American ..... ₩ gross $3.00
Duplex ..... ₩ doz 25¢, dis 15 @ 20 %
Lyman's ..... ₩ doz $3.75, dis 20 %
No. 4, French ..... ₩ doz $2.25, dis 55 @ 60 %
No. 5, Iron handle ..... ₩ gross $6.00, dis 45 @ 50 %
Eureka ..... ₩ doz $2.50, dis 10 %
Sardine Scissors ..... ₩ doz $7.00, dis 55 %
Star ..... ₩ doz $5.00, dis 25&5 %
Sprague, No. 1- ; 2, ; 3, $2.50 ..... dis 50&10&10 %

World's Best, ₩ gross, No. 1, $12.00; No. 2, $24.00; No. 3, $36.00.....dis 50&10 %
Universal.....₩ doz $3.00, dis 35&5 %
Domestic.....₩ doz $2.50, dis 45 %
Champion.....₩ doz $2.00, dis 50 %

Cards.
Horse and Curry.....dis 10 @ 10&10 %
Cotton.....New list, Aug., 1883, dis 10 %
Wool..... " " " dis 10 %

Carpet Stretchers.
Cast Steel, Polished.....₩ doz $8.25
Cast Iron, Steel Points.....₩ doz 80¢
Sockot.....₩ doz $1.75
Bullard's.....dis 25 @ 25&10 %

Carpet Sweepers.
Bissell No. 5.....₩ doz $17.00
Bissell No. 7 New Drop Pan.....₩ doz $19.00
Bissell Grand.....₩ doz $36 00
Grand Rapids.....₩ doz $24.00
Crown Jewel.....No. 1, $18; No. 2, $19; No. 3, $20
Magic.....₩ doz $15.00
Jewel.....₩ doz $17.00
Mystic.....₩ doz $16.00
Cottage.....₩ doz $15.00
Garland.....₩ doz $18.00
Parlor Queen.....₩ doz $24.00
Housewife's Delight.....₩ doz $15.00
Queen.....₩ doz $16.00
Queen, with band.....₩ doz $18.00
King.....₩ doz $30.00
Weed Improved.....₩ doz $18.00
Hub.....₩ doz $16.00
Cog Wheel.....₩ doz $16.00

Cartridges.—See Ammunition.

Casters.
Bed, Plate, Shallow Socket.....} New list: Brass ..dis 55 % Others..dis 60 %
Deep Socket.....40&10 %
Yale Casters, list May, 1884.....dis 30&10&40 %
Yale, Gem.....dis 60&60&5 %
Martin's Patent (Phœnix).....dis 45&10 @ 50 %
Payson's Anti-friction.....dis 60 %
"Giant" Truck Casters.....dis 10 @ 10&5 %
Stationary Truck Casters.....dis 45&10

Cattle Leaders.
Humason, Beckley & Co.'s.....dis 70 @ 70&10 %
Sargent's.....dis 66⅔&10 %
Hotchkiss.....dis 30 %
Peck Stow & W. Co.....dis 50&10 %

Chain.
Trace, 6¼-10-2, exact sizes, ₩ pair.$1 03 } dis 50&10&5
Trace, 6¼-10-3, exact sizes, ₩ pair. .92 } @ 50&10&7½ %
Trace .7-10-2, exact sizes...₩ pair. 1.11 }
NOTE.—Traces, "Regular" sizes 3¢ net ₩ pair less than exact.
Log, Fifth, Stretcher, and other rancy Chains, list Nov. 1, 1884.....dis 50&10 @ 50&10&5 %

American Coil	3-16	¼	5-16	⅜	7-16	½	⅝	¾
In cask lots.	8.50	6.25	5.25	4.60	4.40	4.20	3.95	2.75

Less than cask lots, add ¼@½¢ ₩ ℔.
German Coil, list of June 20, 1887.....dis 60@60&5 %
Ger. Halter Chain, list of June 20, 1887...dis 60@60&5 %
Covert Halter, Hitching and Breast.....dis 50&2 %
Covert Traces.....dis 35&2 %
Oneida Halter Chain (old list).....dis 45 %
Galvanized Pump Chain.....₩ ℔ 6¢ @ 6½¢
Jack Chain, Iron.....dis 70&10 @ 75 %
Jack Chain, Brass.....dis 70&10 @ 75 %

Chalk.
White.....₩ gro 55¢
Red.....₩ gro 75¢
Blue.....₩ gro 90¢
White Crayons.....₩ gro 12¢ @ 12½¢

Chalk Lines.—See Lines.

Chisels.
Socket Framing and Firmer—
Witherby and Douglas, P., S. & W., New Haven and Middlesex, Mix.....} dis 75&5 @ 75&10 %
Buck Bros.....dis 30 %
Merrill.....dis 60&10@60&10&5 %
L. & I. J. White.....dis 30 @ 30&5 %
Tanged Firmers.....dis 40&10 @ 50 %
Tanged Firmers, Butcher's.....$4.75 @ $5.00
Tanged Firmers, Spear & Jackson's.....$6.00 to $
Tanged Firmers, Buck Bros.....dis 30 %
Cold Chisels, ₩ ℔.....16¢ @ 19¢

Chucks.
Beach Patent.....each, $8.00, dis 20 %
Morse's Adjustable.....each, $7.00, dis 20 @ 20&5 %
Danbury.....each, $6.00, dis 30 @ 30&5 %
Syracuse, Bals Pat.....dis 25 %

Clamps.
Providence Tool Co.'s Wrought Iron.....dis 25 %
Adjustable, Gray's.....dis 20 %
Adjustable, Lambert's.....dis 20 %
Adjustable, Snow's.....dis 40&5 %
Adjustable, Hammer's.....dis 15 %
Adjustable, Stearns'.....dis 20&10 %
Stearns' Adjustable Cabinet and Corner...dis 20&10 %
Cabinet, Sargent's.....dis 66⅔&10 %
Carriage Makers', Sargent's.....dis 66⅔&10 %
Ebernard Mfg. Co.....dis 40&5 @ 40&10 %
Warner's.....dis 40&10 @ 40&10&5 %
Saw Clamps.....See Vises

Clips.
Norway, Axle, ¼ & 5-16.....dis 55&5&5
Second grade Norway Axle, ¼ & 5-16.....dis 65&5
Superior Axle Clips.....dis 66⅔&5 @ 66⅔&5&5 %
Norway Spring Bar Clips, 5-16.....dis 60&5&5
Wrought-Iron Felloe Clips.....₩ ℔ 5½¢
Steel Felloe Clips.....₩ ℔ 5¢

Cockeyes.
.....dis 50 %

Cocks, Brass.
Hardware list.....dis 40&10&2 %

Coffee Mills.
Box and Side, List revised Jan. , 1888.dis 50@50&10 %
Selsor's Patent.....$9.50, $10.50, dis 25 %
American, Enterprise Mfg Co.....dis 20&10&30 %
The "Swift," Lane Bro's.....dis 20&10 %
Webb's Patent.....dis 45 %

Compasses, Dividers, &c.
Compasses, Calipers, Dividers.....dis 70@70&10 %
Bemis & Call Co.'s Dividers.....dis 60&5 %
Bemis & Call Co.'s Compasses & Calipers.....dis 50&5 %
Bemis & Call Co.'s Wing & Inside or Outside..dis 50&5 %
Bemis & Call Co.'s Double.....dis 60 %
Bemis & Call Co.'s (Call's Patent Inside).....dis 30 %
Excelsior.....dis 50 %
J. Stevens & Co.'s Calipers and Dividers....dis 25&10 %

Coopers' Tools.
Bradley's.....dis 20 %
Barton's.....dis 20&20&5 %
L. & I. J. White.....dis 20&5 %
Albertson Mfg. Co.....dis 25 %
Beatty's.....dis 40 @ 40&5 %
Sandusky Tool Co.....dis 30 @ 30&5 %

Corkscrews.
Humason & Beckley Mfg. Co.....dis 40 @ 40&10 %
Clough's Patent.....dis 33⅓ @ 33⅓&5 %
Howe Bros. & Hulbert.....dis 45 %

Corn Knives and Cutters.
Bradley's.....dis 10 %
Wadsworth's.....dis 25 %

Cradles.—Grain.....dis 50&10 @ 60 %

Crow Bars.
Cast Steel.....₩ ℔ 4¢
Iron, Steel Points.....₩ ℔ 3½¢

Curry Combs.
Fitch's.....dis 50&10 @ 50&10&10 %
Rubber.....₩ doz $10.00, dis 20 %
Perfect.....dis 50 %

Curtain Pins.
Silvered Glass.....net
White Enamel.....net

Cutlery.
Beaver Falls and Booth's.....dis 33⅓ %
Wostenholme.....$7.75 to $

Dampers, &c.
Dampers and Clips, Buffalo.....dis 40 %
Crown Damper.....dis 40 %
Excelsior.....dis 40&10 %

Dividers—See Compasses.

Dog Collars.
Embossed Gilt, Pope & Stevens' list.....dis 30&10 %
Leather, Pope & Stevens' list.....dis 40 %
Brass, Pope & Stevens' list.....dis 40 %

Door Springs.
Torrey's Rod, regular size.....₩ doz $1.30
Gray's.....₩ gro, $20.00, dis 20 %
Bee Rod.....₩ gro, $20.00, dis 20 %
Warner's No. 1, ₩ doz. $2.50; No. 2, $3.30, dis 40&10&50 %
Gem (Coil), list April 19, 1886.....dis 10 %
Star (Coil), list April 19, 1886.....dis 20 %
Victor (Coil).....dis 60 @ 60&10 %
Champion (Coil).....dis 60&10 @ 60&10&10 %
Philadelphia.....5 in., $5.00; 8 in., $7.75, dis 30 %
Cowell's.....No. 1, ₩ doz $18.00; No. 2, $15.00, dis 50 %
Rubber, complete.....₩ doz $4.50, dis 55&10 %
Hercules.....dis 50 %
Shaw Door Check and Spring.....dis 25 @ 30 @ 35 %
Elliott's Door Check and Spring.....dis 25 %

Drawing Knives.
Witherby and Douglas, P., S. & W., New Haven and Middlesex.....} dis 75&10 @ 75, 10&5 %
Merrill.....dis 60&10&10 %
Watrous.....dis 15&10 @ 25 %
L. & I. J. White.....dis 20&5 %
Bradley's.....dis 35 %
Adjustable Handle.....dis 20 @ 25 %
Wilkinson's Folding.....dis 25 @ 25&5 %

Drills and Drill Stocks.
Blacksmiths'.....each, $1.60 @ $1.65
Blacksmiths' Self-Feeding.....each, $7.50, dis 20 %
Breast, P. S. & W.....dis 40&10 %
Breast, Wilson's.....dis 30&5 %
Breast, Millers Falls.....each, $3.00 dis 25 %
Breast, Bartholomew's... each, $2.50, dis 25&10 @ 40 %
Ratchet, Merrill's.....dis 20 @ 20 & 5 %
Ratchet, Ingersoll's.....dis 25 %
Ratchet, Parker's.....dis 20 @ 20&5 %
Ratchet, Whitney's.....dis 20&10 %
Ratchet, Weston's.....dis 20@25 %
Ratchet, Moore's Tripie Action.....dis 25 @ 30 %
Whitney's Hand Drill, Plain, $11.00; Adjustable, $12.00.....dis 20&10 %
Wilson's Drill Stocks.....dis 1
Automatic Boring Tools.....each, $1.75 @ $1.85
Twist Drills—
Morse.....dis 50&10&5 %
Standard.....dis 50&10&5 %
Syracuse.....dis 50&10&5 %
Cleveland.....dis 50&10&5 %
Williams.....dis 50&10&10 %
Drill Bits.—See Augers and Bits.
Drill Chucks.—See Chucks.
Dripping Pans.
Small sizes.....₩ ℔ 7 ¢
Large sizes.....₩ ℔ 6½ ¢

Egg Beaters.
Dover.....₩ doz., $2.00
National.....₩ doz $4.50, dis 33⅓ %
Family (T. & S. Mfg. Co.).....₩ gro, $17.00&$18.00
Standard (Standard Co.).....₩ gro, $9.00
Kingston (Standard Co.).....₩ gro, $6.50
Acme (Standard Co.).....₩ gro, 16.00
Dupex (Standard Co.).....₩ gro, $18.00
Rival (Standard Co.).....₩ gro, $12.00
Triumph (T. & S. Mfg. Co.).....₩ gro, 10.50&$11.50
Advance No. 1.....₩ gro $10.50
Advance, No. 2.....₩ gro $10.00
Bryant's.....₩ gro $15.00
Ayres' Spiral.....₩ gro $5
Paine, Diehl & Co's.....₩ gro $24.00
Electric Bell Sets.—Wollensak's.....dis 15 %
Bigelow & Dowse.....dis 20 %

Emery.

	No. 4 to 46 gr.	No. 54 to 150 gr.	Flour, C F F.
Kegs, ₩ ℔	4 ¢	5 ¢	2½¢
½ kegs, ₩ ℔	4¼¢	5¼¢	2¾¢
¼ kegs, ₩ ℔	4½¢	5½¢	3 ¢
10-℔ cans, 10 in case	6 ¢	6½¢	5 ¢
10-℔ cans, less than 10	10 ¢	10 ¢	7½¢

Enameled and Tinned Ware.—See Hollow-Ware.

Escutcheon Pins.
Iron, list Nov. 11, 1885.....dis 50&10 @ 50&10&5
Brass.....dis 60 @ 60&5 %

Escutcheons.
Door Lock.....Same discounts as Door Locks
Brass Thread.....dis 60 @ 60&10 %
Wood.....dis 25 %

Faucets.
Fenn's.....dis 40 %
Bohren's Patent Rubber Ball.....dis 25 %
Fenn's Cork Stops.....dis 33⅓ %
Star.....dis 60 @ 60&5 %
Frary's Patent Petroleum.....dis 40&10&2 %
West's Patent Key.....dis 50&10 %
Anchor Lock.....dis 45 %
Metallic Key, Leather Lined.....dis 55&10 @ 60&10 %
Cork Lined.....dis 70 @ 70&10 %
Burnside's Red Cedar.....dis 50 %
Burnside's Red Cedar, bbl. lots.....dis 50&10 %
J. Sommer's Best Block Tin Key.....dis 40 %
J. Sommer's Cork Lined, 1st quality.....dis 50 %
J. Sommer's Diamond Lock.....dis 40 %
J. Sommer's Perfection, Fla. Red Cedar.....dis 50 %
J. Sommer's Goodenough Cedar.....dis 60 %
Self-Measuring, Enterprise...₩ doz $36.00—dis 20&10 %
Self-Measuring, Lane's.....₩ doz $36.00—dis 25&10 %
Self-Measuring, Victor.....₩ doz $36.00—dis 25&10 %
Felloe Plates......₩ ℔ 6 @ 6½¢

Fifth Wheels.—Derby and Cincinnati .dis 45&5 %

Files.
Domestic—
Best brands.....dis 60&10 @ 60&10&5 %
Good brands.....dis 60&10&5 @ 60&10&10 %
Fair brands.....dis 70 @ 70&10 %
Heller's Horse Rasps.....dis 50&7½ @ 50&10 %
Imported—
J. & Riley Carr.....List, April 1, 1883, dis 15 %
J. & Riley Carr Horse Rasps.....dis 10 %
Moss & Gamble.....List April 1, 1883, dis 15 %
Butcher.....Butcher's list, dis 20 %
Stubs.....Stubs list, dis 25 @ 30 %
Turton's.....Turton &list dis. 20 @ 25 %
Greaves' Horse Rasps.....American list. dis. 60 %

Fluting Machines.
Knox, 4½-inch Rolls.....$3.25 each } dis 35 %
Knox, 6-inch Rolls.....$3.60 each }
Eagle, 3½-inch Roll.....$2.15, dis 35 %
Eagle, 5½-inch Roll.....2.85, dis 35 %
Crown, 4½-in., $3.50; 6-in., $4.00; 8-in., $5.50 each, dis 35 %
Crown Jewel.....6-in., $2.50 each, dis 35 %
American, 5-in. $3; 6-in., $3.40; 7-in., $4.50 each, dis 35 %
Domestic Fluter.....$1.50 each, net
Geneva Hand Fluter, White Metal..₩ doz $12, dis 25 %
Crown Hand Fluter, Nos. 1, $15; 2, $12.50; 3, $10.dis 30 %
Shepard Hand Fluter, No. 85.....₩ doz $15.30, dis 40 %
Shepard Hand Fluter, No. 110.....₩ doz $11, dis 40 %
hepard Hand Fluter, No. 95.....₩ doz $8, dis 40 %
Clark's Hand Fluter.....₩ doz $15.00, dis 35 %
Combined Fluter and Sad Iron...₩ doz $15.00, dis 30 %
Buffalo.....₩ doz $10.00 dis 10 %

Fluting Scissors......dis 45 %

Forks.—Hay, Manure, &c., Asso. list.....dis 65&5 %
Hay, Manure, &c., Phila. list.....dis 60 @ 60&5 %
Plated, see Spoons.

Freezers, Ice Cream.
Shepard's Lightning.....dis 65 %

Fruit and Jelly Presses.
Enterprise Mfg. Co.....dis 20&10 @ 30 %
Wenis.....₩ doz $4.50
Shepard's Queen City.....dis 40 %

Fry Pans.
Association List.....dis 75 @ 75&10 %

No.	0	1	2	3	4	5	6	7	8
₩ doz.	$3.75	4.70	5.30	5.95	6.55	7.50	8.75	10.00	11.25

Fuse.
Common Hemp Fuse, for dry ground.....$2.70
Common Cotton Fuse, for dry ground.....2.85
Single Taped Fuse, for wet ground.....4.75
Double Taped Fuse, for very wet ground.....6.00
Triple Taped Fuse, for very wet ground.....7.25
Small Gutta Percha Fuse, for water.....7.50
Large Gutta Percha Fuse, for water.....12.00

Gauges.
Marking Mortise, &c .....dis 60&10 %
Wire, low list.....dis 10&10 ¢
Wire, Wheeler, Madden & Co.....dis 10 %
Wire, Morse's.....dis 50 @ 50&5 %
Wire, Brown & Sharpe's.....dis 10 @ 20 %

Gimlets.—Nail and Spike.....dis 50&10&5 %
"Eureka" Gimlets.....dis 40&10 %
"Diamond" Gimlets.....₩ gross $5.00
Double Cut, Shepardson's.....dis 45 @ 45&5 %
Double Cut, Ives'.....dis 60 @ 60&5 %
Double Cut, Douglass'.....dis 40&10 %
"Bee".....₩ gross $12, dis 25 @ 25&5 %

Glue.
Le Page's Liquid.....dis 25 @ 25&5 %

Glue Pots.
Tinned and Enameled.....dis 40&5 @ 40&10 %
Family, Howe's "Eureka".....dis 40 %
Family, L. F. & C.'s "Handy".....dis 50 %

Grindstone Fixtures.
Sargent's Patent.....dis 70&10 %
Reading Hardware Co.....dis 30&10 %

Hack Saws.—See Saws.

Halters.—Covert's Pat. ¼ Jute.....dis 50&2 %
Covert's Hemp Horse and Cattle Tie.....dis 50&2 %
Covert's Jute Horse and Cattle Ties.....dis 60&10&2 %

Hammers.
Handled Hammers.
Maydole's.....List Dec. 1, 1885, dis 25 @ 25&1 0%
Buffalo Hammer Co.....
C. Hammond & Son.....
Humason & Beckley.....
Atha Tool Co.....
} List Jan. 15, '87 Dis. 50 @ 50& 10 %
Ferree.....dis 5 %
Magnetic Tack, Nos. 1, 2, 3, $1.25, 1.50 & 1.75, dis 30&10 %
Nelson Tool Works.....dis 40&10 %
Warner & Nobles.....dis 20 @ 25 %
Peck, Stow & Wilcox.....dis 40 %
Sargent's.....dis 33⅓&10 %
Heavy Hammers and Sledges—
3 ℔ and under, 3 to 5 ℔, Over 5 ℔.....₩ ℔ 40¢ } dis 70 @ 70 &5 %
Wilkinson's Smiths'.....10½¢ @ 11¢ ₩ ℔

Hand Cuffs and Leg Irons.
Providence Tool Co., Hand Cuffs, $15.00 ₩ doz...dis 10%
Providence Tool Co. Leg Irons, $25.00 ₩ doz....dis 10 %
Tower's.....dis 25 %
Daley's Improved Hand Cuffs: 2 Hands, Polished, ₩ doz. $48; Nickeled, $57; 3 Hands, Polished, ₩ doz. $72; Nickeled, $84.....dis 20 %

Handles.
Iron, Wrought or Cast.—
Door or Thumb.

Nos.	0	1	2	3	4
Per doz.	$0.90	1.00	1.15	1.35	1.50

....dis 60&10&10 %
Roggin's Latches.....₩ doz. 30¢ @ 35¢
Bronze Iron Drop Latches.....₩ doz. 70¢ net
Jap'd Store Door Handles—Nuts, $1.62; Plate, $1.10; no Plate, $0.88.....net
Barn Door.....₩ dos. $1.40, dis 10&10 %
Chest and Lifting.....dis 70 %

Handles, Wood—
Saw and Plane.....dis 40&10 @ 40&10&5 %
Hammer, Hatchet, Axe, Sledge, &c.....dis 35 %
Brad Awl.....₩ gross $2.00
Hickory Firmer Chisel, assorted.....₩ gross 4.50
Hickory Firmer Chisel, large.....₩ gross 5.00
Apple Firmer Chisel, assorted.....₩ gross 5.00
Apple Firmer Chisel, large.....₩ gross 6.00
Socket Firmer Chisel, assorted.....₩ gross 3.00
Socket Framing Chisel, assorted.....₩ gross 5.00
} dis 40 @
J. B. Smith Co.'s Pat. File.....dis 50 %
File, assorted.....₩ gross 2.75 } dis 40 @ 40&10 %
Auger, assorted.....₩ gross 5.00
Auger, large.....₩ gross 7.00
Patent Auger, Ives'.....dis 30&10 %
ent Auger, Douglass'.....₩ set $1.25 net
Patent Auger, Swan's.....₩ set $1.00 net
Hoe, Rake, Shovel, &c.....dis 50&10 %
Cross Cut Saw Handles—
Atkins' No. 1 Loop, ₩ pair, 30¢ No. 3, 22¢; No. 2 and No. 4 Reversible, 22¢.
Boynton's Loop Saw Handles.....50¢, dis 60 %
Champion.....15¢

Hangers.
Barn Door, old patterns.....dis 60&10&10 @ 70 %
Barn Door, New England.....dis 60&10&10 @ 70 %
Samson Steel Anti-Friction.....dis 55 %
Orleans Steel.....dis 55 %
Hamilton Wrought Wood Track.....dis 55 %
U. S. Wood Track.....dis 65 %
Champion.....dis 60&10 %
Rider and Wooster, Medina Mfg. Co.'s list.....dis 70 %
Climax Anti-Friction.....dis 55 %
Climax Steel Anti-Friction.....dis 50 %
Zenith for Wood Track.....dis 55 %
Reed's Steel Arm.....dis 40 %
Challenge, Barn Door.....dis 50 %
Sterling Improved (Anti-Friction).....dis 65&10 %
Victor, No. 1, $15; No. 2, $16.50; No. 3, $18.....dis 50&2 %
Cheritree.....dis 50&5 %
Kidder's.....dis 50&10 @ 60 %
The "Boss".....dis 60

Best Anti-Friction.....dis 60 %
Duplex (Wood Track).....dis 60 %
Terry's Patent.....₩ doz. pr. 3¼ in. $10; 5 in.. $12.....dis 50 @ 50&5 %
Cronk's Patent.....No. 4, $12; No. 5, $14.40; No. 6, $18 %.....dis 50&10 @ 50&15 %
Wood Track Iron Clad..₩ ft. 10¢, dis 50&10 @ 50&15 %
Carrier Anti-Friction.....dis 50&10%
Architect.....₩ set $6.00, dis 20 %
Eclipse.....dis 20&10
Felix.....₩ set $4.50, dis 20 %
Richards'.....dis30&30&10 %
Lane's Steel Anti-Friction.....dis 40&10 %
The Ball Bearing Door Hanger....dis 20&10 @ 25&10 %
Warner's Patent.....dis 20@20&10 %
Stearns' Anti-Friction.....dis 20 @ 20&10 %
Stearns' Challenge.....dis 25&10 @ 25&10&10 %
Faultless.....dis 40 @ 40&5 %
American.....₩ set $6; dis 20&10 %
Rider & Wooster, No. 1, 62½¢; No. 2, 75¢.....dis 40 %
Paragon, Nos. 1, 2 and 3.....dis 40&10 %
Paragon, Nos. 5, 5¼, 7 and 8.....dis 20&10 %
Crescent.....dis 60@60&10 %
Nickel, Cast Iron.....dis 50 %
Nickel, Malleable Iron and Steel.....dis 40 %

Harness Snaps.—See Snaps.

Hatchets.—List Jan. 1, 1886.

Isaiah Blood.....dis 35 @ 40%
Hunt's Shingling Lath and Claw.....dis 40&5 %
Hunt's Broad.....dis 40 %
Buffalo Hammer Co.....dis 40&10@50 %
Hurd's.....dis 40&5 @ 40&10&5%
Yerkes & Plumb.....40&5 @ 40&10 %
Wm. Mann, Jr., & Co.....dis 50 @ 50&5%
Underhill Edge Tool Co.....dis 40&5 @ 40&10 %
Underhill's Haines and Bright goods.....dis 33⅓ %
C. Hammond & Son.....dis 40&10 @ 50 %
Simmons.....dis 35 @ 40 %
Peck's.....dis 40&10 @ 40&10&5 %
Kelly's.....dis 50@50&5 %
Sargent & Co.....dis 50 %
Ten Eyck Edge Tool Co.....dis 40&10@40&10&5 %
Collins, following list.....dis 10 %
Shingling, Nos. 1 2 3.....₩ doz $5.50 $6.00 $6.50
Claw, Nos. 1 2 3.....₩ doz 6.00 6.50 7.00
Lathing Nos. 1 2 3.....₩ doz 5.50 6.00 6.50

Hay Knives.

Lightning.....Mfrs. price ₩ doz $18 dis 25 % ; Jobber's Extras
Electric.....₩ doz $17 } dis 30 @
Gem.....₩ doz $18 } 30&5%
Wadsworth's.....dis 40&7½ @ 40&10 %
Carter's Needle.....₩ doz $11.50 @ $12.00
Heath's.....₩ doz $13.50 @ $14.00

Hinges.

Wrought Iron Hinges—
Strap and T.....dis70&5 @ 70&10 %
Screw Hook and Strap. { 8, 10, 12 in., ₩ lb..... 3½¢ / 14 to 36 in. ₩ lb..... 2½¢
Heavy Welded Hook and Eye. { 8 to 12 in., ₩ lb..... 3½¢ / 14 in. & up, ₩ lb..... 2½¢
Screw Hook and Eye. { ½ in....₩ doz $1.50 } dis / ⅝ in....₩ doz $2.45 } 10% / ¾ in....₩ doz $3.80 }
Rolled Blind Hinges, Nos 32 and 34.....dis 50&10 %
Rolled Blind Hinges, Nos. 232 and 234.....dis 55&10 %
Rolled Plate.....dis 70&10 %
Rolled Raised.....dis 70&10 %
Plate Hinges { 8, 10 & 12 in., ₩ lb..... 4½¢ / "Providence" } over 12 in., ₩ lb..... 3½¢

Spring Hinges—
Geer's Spring and Blank Butts.....dis 40 %
Union Spring Hinge Co.'s list, March. 1886.....dis 20 %
Acme, Crown, Empire and U. S.....dis 30 %
American, Gem, and Star, Japanned.....dis 20 %
American, Gem, and Star, Bronzed.....net
Oxford, Bronze and Brass.....net
Barker's Double Acting.....dis 20&10 %
Union Mfg. Co.....dis 25 %
Bommer's.....dis 30 %
Buckman's.....dis 15@20 %
Chicago.....dis 30 %

Gate Hinges—
Western.....₩ doz $4.40, dis 55 %
N. E.....₩ doz $7.00, dis 55 %
N. E. Reversible.....₩ doz $5.20, dis 55&10 %
Clark's, Nos. 1 2 3.....dis 60&10 @ 60&10&5 %
N. Y. State.....₩ doz $5.00, dis 55&10 %
Automatic.....₩ doz $12.50, dis 50 %
Common Sense.....₩ doz pair $4.50, dis 50 %
Seymour's.....dis 45&10 %
Shepard's, Nos. 1, 2, 10 and 20.dis 60&10@60&10&10 %
Shepard's, No. 3.....dis 60&10@60&10&10 %
Reed's Latch and Hinges.....₩ doz sets $12, dis 50 %

Blind Hinges—
Parker.....dis 75&2 %
Palmer.....dis 50&5&10 %
Seymour.....dis 70&2 %
Nicholson.....dis 45&10 %
Huffer.....dis 50 %
Clark's, Nos. 1, 3, 5, 40 and 50.....dis 75&10&5&80 %
Clark's Mortise Gravity.....dis 50 %
Sargent's, Nos. 1, 8, 5, 11, 13...dis 75&10@75&10&5 %
Sargent's, No. 12.....dis 75&10&10 %
Reading's Gravity.....dis 75&10 @ 75&10&5 %
Shepard's "Noiseless." Nos. 50, 60, 65 & 55.....dis 75&10&5 %
Shepard's Niagara Gravity, Nos. 1, 3 and 5...dis 80 %
Shepard's Buffalo Gravity, Nos. 1, 3 and 5.....dis 80&2½ %
Shepard's Champion Gravity No. 75.....dis 80&10&5 %
Shepard's Steamboat Gravity, No. 10.....dis 80&20 %
Shepard's Acme Lull & Porter.....dis 75&5@75&10 %
Shepard's O. S. Lull & Porter.....dis 75&10 %
Shepard's "Queen City" Reversible.....dis 70&10 %
Clark's Lull & Porter, Nos. 0, 1, 1¼, 2, 2½, 3.....dis 75&10@2½ %
North's Automatic Blind Fixtures, No. 2, for Wood, $10.50; No. 3, for Brick, $13.50.....dis 25&2 %

Hoes.

Handled—
Garden, Mortar, &c.....dis 65&5 %
Planter's, Cotton, &c.....dis 65&5 %
Warren Hoe.....dis 60 %
Magic.....₩ doz $4.1

Eye—
D. & H. Scovil.....dis 15 %
Lane's Crescent Scovil Pattern.....dis 45 %
Lane's Crescent Planters Pattern.....dis 45 & 0 %
Lane's Razor Blade, Scovil Pattern.....dis 30 %
Maynard. S. & O. Pat.....dis 45&5 %
Sandusky Tool Co., " " .....dis 60 %
Hubbard & Co., " " .....dis 60 %
Barc " " .....dis 60 %
Grub.....dis 60 @ 60&10 %

Hog Rings and Ringers.

Hill's Improved Ringers.....₩ doz. $5.50 @ 5.75
Hill's Old Style Ringers.....₩ doz. $4.00 @ 3.25
Hill's Tongs.....₩ doz, $5.50 @ 6.00
Hill's Rings.....₩ doz boxes, $2.00 @ 2.25
Perfect Rings.....₩ doz boxes $1.75 @ 2.00
Perfect Ringers.....₩ doz. $2.50
Blair's Hog Ringers.....₩ doz, $2.60
Blair's Hog Rings.....₩ doz, 90¢ @ $1.00
Champion Ringers.....₩ doz $2.00
Champion Rings, Double.....₩ doz, $2.25
Brown's Ringers.....₩ doz, $2.00
Brown's Rings.....₩ doz, $1.25 @ 1.50

Hoisting Apparatus

"Moore's" Hand Hoist, with Lock Brake.....dis 15 %
"Moore's" Differential Pulley Block.....dis 20 %

Holders, Tool.

Bals Pat.....₩ doz $4; dis 25 %

Hollow-Ware.

Iron—
Stove Hollow-Ware. Ground..dis 60&10@60&10&10 %
Stove Hollow-Ware. Unground dis 70&10@70&10&5 %
Enameled and Tinned Hollow-Ware—
Kettles.....dis 70&10 %
Oval Boilers, Saucepans & Glue Pots.....dis 40&10 @ 40&10&5 %
Gray Enameled Ware.....dis 40 @ 40&5 %
Agate and Granite Ware.....dis 25 %
Rustless Hollow-Ware.....dis 50 @ 50&5 %
Galvanized Tea-Kettles—

Inch.....	6	7	8	9
Each....	55¢	60¢	65¢	75¢

Silver Plated—
Reed & Barton.....dis 40&5 %
Meriden Britannia Co.....dis 40&5 %
Simpson, Hall, Miller & Co.....dis 40&5 %
Rogers & Brother.....dis 40&5 %
Hartford Silver Plate Co.....dis 40&5&5 %
William Rogers Mfg. Co.....dis 40&5&5 %

Hooks.

Cast Iron—
Bird Cage, Sargent's list.....dis 60&10&10 %
Bird Cage, Reading.....dis 60&10&10 %
Clothes Line, Sargent's list.....dis 60&10&10 %
Clothes Line, Reading list. dis 60&10 @ 60&10&10 %
Ceiling, Sargent's list.....dis55&10&10 %
Harness, Reading list.....dis 55&10 @ 55&10&10 %
Coat and Hat, Sargent's list.....dis 55&10 %
Coat and Hat, Reading.....dis 50&10 @ 50&10&10 %

Wrought Iron—
Cotton.....₩ dos $1.2
Cotton Pat. (N. Y. Mallet & Handle W'ks).....dis 30 %
Tassel and Picture (T. & S. Mfg. Co.).....dis 50 %
Wrought Staples, Hooks, &c.....See Wrought Goods
Bench Hooks.....See Bench Stops

Wire—
Wire Coat and Hat, Gem, list April, 1886.....dis 45 %
Wire Coat and Hat, Miles', list April, 1886.....dis 45
Indestructible Coat and Hat.....dis. 45 %
Belt.....dis 75&10 @ 80 %
Grass.....₩ doz $2.00
Rush.....dis 55 @ 60 %
Whiffletree—Patent.....dis 55 %
Hooks and Eyes—Malleable Iron.....dis 70 %
Hooks and Eyes—Brass.....dis 60&10&10 %
Fish Hooks, American.....dis 50 %

Horse Nails.

	Nos.	6	7	8	9	10	
Ausable		28¢	26¢	25¢	24¢	23¢.	dis 25&10 @ 25&10&10 %
Clinton. Fin		24¢	22¢	21¢	20¢	19¢	dis 40&10 @ 50 %
Essex		28¢	26¢	25¢	24¢	23¢.	dis 25&10 @ 25&10&10 %
Putnam		24¢	22¢	21¢	20¢	19¢	dis 5&10&2½&2½ %
Vulcan		23¢	21¢	20¢	19¢	18¢	dis 12½&5&5 %
Northwest'n.		25¢	23¢	22¢	21¢	20¢	dis 10&10 @ 10&5 %
Grove		25¢	23¢	22¢	21¢	20¢	dis 12½&5&5 %
A. C.		25¢	23¢	22¢	21¢	20¢	dis 25&10 @ 25&10&5 %
C. B.-K		25¢	23¢	22¢	21¢	20¢	dis 25&10 @ 25&10&5 %
Champlain		28¢	26¢	25¢	24¢	23¢	dis25&10&10&5 %
New Haven		28¢	26¢	25¢	24¢	23¢	dis25&10@25&10&10 %
Saranac		23¢	21¢	20¢	19¢	18¢	dis 30&10 %
Champion		25¢	23¢	22¢	21¢	20¢	dis 10&10&10 %
Capewell		28¢	26¢	25¢	24¢	23¢	dis 35&5 @ 35&10 %
Star		23¢	21¢	20¢	19¢	18¢	dis 10&10&10&12½

Western.....10¢ per lb, all sizes
Empire Bronzed.....14¢ per lb.

Horse Shoes.—See Shoes, Horse.

Hose, Rubber, competition.....75&10 @ 80 %
Standard.....dis 70&70&10 %
Extra.....dis 60@10&10 %
N. Y. B. & P. Co., Para.....dis 30&10 %
N. Y. B. & P. Co., Extra.....dis 50&5 %
N. Y. B. & P. Co., Dundee.....dis 60&10&10 %

Ice Picks, Chisels, &c.

Am. Ice Chisel Pol'd.....₩ doz $3.00, dis 20@20&5 %
National Ice Chisel.....₩ doz $6.25, dis 20 %
Novelty Ice Breakers.....₩ doz $6.25, dis 20 %
Dunlap's Ring Picks.....₩ doz $2.00, dis 15 %
Wood Head Picks, Sargent's...₩ doz $1.60, dis 50&10 %
Iron Head Picks, Sargent's.....₩ doz $1.25, dis 50&10 %
Ice Mallets, Pick in handle.....₩ doz $2.00, dis 15 %
Ice Axes, Small Cast or Mall...₩ doz $1.25, dis 20&10 %
Combination Ice Tools.....₩ doz $2.00 net
Acme Ice Pick and Tongs...₩ gross $55.00, dis 50&10 %
Roger's Lightning Ice Chisel.....₩ gross $28.50

Ice Tongs.

Champion, S. S. & Co.....₩ doz $4.00, dis 25&10 %
Family.....₩ doz $2.75, dis 20@25 %

Jack Screws.—See Screws.

Kettles.

	Spun.	Stamped.
Brass, 7 to 17 in., ₩ lb.....	24¢	22¢
Brass larger than 17 inches, ₩ lb.....	26¢	24¢

Enameled and Tea Kettles.....See *Hollow-Ware*

Keys.

Lock Asso'n list Dec. 30, 1886.....dis 50&10 @ 60&5 %
Eagle, Cabinet, Trunk and Padlock.....dis 33⅓&2 %
Hotchkiss' Brass Blanks.....dis 40 %
Hotchkiss' Copper and Tinned.....dis 40 %
Hotchkiss' Padlock and Cabinet.....dis 35 %
Ratchet Bed Keys.....₩ doz $4.00, dis 15 %

Knife Sharpeners.

Parkin's Applewood Handles.....₩ doz $6.00, dis 40 %
Parsin's Rosewood or Cocobolo...₩ doz $9.00, dis 40 %

Knives.

Wilson's Butcher Knives.....dis 20 @ 25 %
Ames' Butcher Knives.....dis 25 %
Nichols' Butcher Knives.....dis 40&10
Ames' Shoe Knives.....dis 20@25 %
Ames' Bread Knives.....₩ doz $1.50, dis 15 @ 20 %
Moran's Shoe and Bread Knives.....dis 20 %
Hay and Straw.....See Hay Knives
Table and Pocket.....See Cutlery

Knobs.

Door Mineral.....65@70¢
Door Por. Jap'd.....75@80¢
Door Por. Por. Nickel.....$2.00 @ 2.25
Door Por. Plated, Nickel.....$2.00 @ 2.25
Drawer, Porcelain.....dis 55&10&10@6. &10&10 %
Hemacite Door Knobs, new list.....dis 40&10@50 %
Yale & Towne Wood Knobs, list Dec., 1885.....dis 40 %
Furniture Plain.....75¢ gross inch. dis 10 %
Furniture, Wood Screws.....dis 25&10 %
Base, Rubber Tip.....dis 70&10&25 %
Picture, Judd's.....dis 60&10&10 @ 70 %
Picture, Sargent's.....dis 66⅔&10 %
Picture, Hemacite.....dis 35&5 %
Shutter, Porcelain.....dis 65&10 %
Carriage, Japanned.....₩ gross 80¢, dis 60&10 %

Ladles.

Melting, Sargent's.....dis 55&10
Melting, Reading.....dis 35&10%
Melting, Monroe's Patent.....₩ doz. $4.00, dis 40%
Melting, P. S. & W.....dis 35&10 @ 40 %
Melting, Warner's.....dis 30%

Lanterns.

Tubular, No. 9, without Guards.....₩ doz $5.75
Tubular, Liftwire, No. 0, without Guards ₩ doz $8.50
Tubular, Hinge Tip No. 0, without Guards, ₩ doz $6.25
Tubular, Bottom Lift, without Guards ..₩ doz $6.25
Tubular, U. S. Safety Lift Wire, no Guards, ₩ doz $5.00
Guards for Tubulars, add ₩ doz.....
Police, Small, $3.00; Med. $7.25; Large, $9.75. dis 20@25 %
Porter's Tin R. R.....$10 dis20 %

Lemon Squeezers.

Porcelain Lined, No. 1.....₩ doz. $6.00, dis 25&30 %
Wood, No. 2.....₩ doz. $3.00, dis 35 %
Wood, Common.....₩ doz $1.70 @ 1.75
Dunlap's Improved.....₩ doz. $3.75, dis 20 %
Sammis'.....No. 1, $5; 2, $9; 12, $18 ₩ doz. dis 25&10 %
Jennings' "Star".....₩ doz $2.50
The "Boss".....₩ doz $2.50
Dean's.....Nos. 1, ₩ doz $6.50; 2, $8.35; 3, $1.00
Little Giant.....dis 50 @ 50&5 %
King.....dis 40&5 %

Lines.

Cotton and Linen Fish, Draper's.....dis 50 %
Draper's Chalk.....dis 60 %
Draper's Mason's Linen, 84 ft., No. 1, $1.25; No. 2, $1.75; No. 3, $2.25; No. 4, $2.75; No. 5, $3.25..dis 25 %
Cotton Chalk.....dis 55 %
Samson, Cotton, No. 4, $2; No. 4½, $2.50.....dis 10 %
Silver Lake, Braided, Nos. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ₩ gross.....dis 25 %
Masons' Linen, No. 3½, $1.50; No. 4, $2; No. 4½, $2.50
Masons' Colored Cotton.....dis 45
Wire Clothes, No. 18, $3.75; No 19, $3.25; No. 20, $2.75.
Ventilator Cord, Samson Braided, White or Drab Cotton.....$7.50 ₩ doz. dis 20

Locks, Padlocks, Cabinet Locks, &c.

Door Locks, Latches, &c.—
List, Dec. 30, '86, ched Feb. 2, '87...dis 50&10 @ 60&5 %
Note.—Lower net prices often made.
Reading Hardware Co. (list Jan. 1, '86).dis 40@40&10 %
Livingston & Co.....dis 70 %
Perkins' Burglar Proof.....dis 60&25 %
Plate.....dis 33⅓&2 %
F. Many's "Extension Cylinder".....$10.50 ₩ doz
Barnes Mfg. Co.....dis 40 %
Yale Corrugated Key.....dis 33⅓ %
Dietz Flat Key.....dis 30 %
L. & C. Round Key Latches.....dis 30&10 %
L. & C. Flat Key Latches.....dis 33⅓&10 %
Romer's Night Latches.....dis 20 %
Yale new list.....dis 33⅓ %
"Shepardson" or "U. S.".....dis 35 %
"Welter" or "American".....dis 40&10 %
Seed's N. Y. Hasp Lock.....dis 25 %

Cabinet—
Eagle, Gaylord Parker and Corbin, } List March, '84, revised Jan. 1, '85.dis33⅓&2 %
Delts, Nos. 36 to 39.....dis 40 %
Delts, Nos. 51 to 63.....dis 40 &10 %
Dietz, Nos. 86 to 90.....dis 30 %
Stoddard Lock Co.....dis 30 @ 33⅓ %
"Champion" Night Latches.....dis 40 %
Barnes Mfg. Co.....dis 40 %
Eagle and Corbin Trunk.....dis 25&2 %
"Champion" Cabinet and Combination....dis 33⅓ %
Yale.....dis 33⅓ %
Romer's.....dis 25 %

Padlocks—
List, Dec. 23, 84.....dis 65&10&2@—'8
Yale Lock Mfg. Co. s.....dis 33⅓ %
Eagle.....dis 25&2 %
Eureka, Eagle Lock Co.....dis 40&2 %
Romer's, Nos. 0 to 91.....dis 35 %
Romer's, Nos. 200 to 505.....dis 20 %
A. E. Dietz.....dis 40 %
"Champion" Padlocks.....dis 40 %
Hotchkiss.....dis 30 %
"Star".....dis 45 %
"Horse Shoe." ₩ doz.. $9.....dis 40 %
Barnes Mfg. Co.....'is 40 %
Nock's.....dis 30 %
Brown's Patent.....dis 5.5 %
Scandinavian.....dis90 %
Fraim's Pat. Scandinavian, new list (low)....dis 60 %

Lumber Tools.

Ring Peavies, "Blue Line" Finish.....₩ doz $20.00
Ring Peaves, Common Finish.....₩ doz $18.00
Steel Socket Peavies.....₩ doz $21.00
Wall. Iron Socket Peavies.....₩ doz $19.00
Cant Hooks, "Blue Line" Finish.....₩ doz $16.00
Cant Hooks, Common Finish.....₩ doz $14.00
Cant Hooks, Mall. Socket Clasp, "Blue Line" Finish.....₩ doz $16.00
Cant Hooks, Mall. Socket Clasp Common Finish.....₩ doz $14.50
Cant Hooks, Clip Clasp, "Blue Line" Fin. ₩ doz $14.00
Cant Hooks, Clip Clasp, Common Finish..₩ doz $12.00
Hand Spikes.....₩ doz 6 ft., $15.00; 8 ft., $20
Pike Poles, Pike & Hook, 12 ft. 14 ft. 16 ft. 18 ft. 20 ft. ₩ doz.....$11.50 12.50 14.50 17.50 21.50
Pike Poles, Pike only, ₩ doz.....10.00 11.00 13.00 16.00 20.00
Pike Poles not Ironed, ₩ doz.....6.00 7.00 9.00 12.00 16.00
Setting Poles, ₩ doz..... 14.00 15.00 17.00
wamp Hooks.....₩ doz $18.00
Landing Blocks.....₩ doz $22.50
Skidding Tongs.....₩ doz $51.00
Log Binders.....₩ doz $26.00
Bended Boot Calks, 1 to 5 M, dis 25 % ; 5 to 10 M, dis 30 %
Square Steel Boot Calks.....dis 40 %
Chain Rafting Dogs.....₩ 100 $12.50
Ring Rafting Dogs...₩ 100, med., $16.00; large, $12.00
Timber Grapples.....₩ doz $30.00

Lustre.

Four-ounce Bottles.....₩ doz. $1.75 ₩ gro. $17. 00

Mallets.

Hickory.....dis 20&10@20&10&10 %
Lignumvitæ.....dis 20&10@20&10&10 %
B. & L. Block Co, Hickory and L. V...dis 30 @ 30&10 %

Mattocks.—Regular list.....dis 60&5 @ 60&10 %

Meat Cutters.

Dixon's—Nos.	1	2	3	4	
₩ dos.	$14.00	17.00	19.00	30.00	—dis 45 %
Woodruff's	Nos.	100	150		
₩ doz.	$15.00	18.00	—dis 45 %		
Champion	Nos.	200	300	400	
₩ dos.	$22.00	27.00	40.00	—dis 45 %	
Hales' Pattern	Nos.	11	12	13	
₩ doz.	$27.00	33.00	45.00	dis 70 @ 70 & 5 %	

American.....dis 30 %

Nos.	1	2	3	4B	
Each	$5.00	7.00	10.00	25.00	50.00 60.00

Enterprise.....dis 30 %

Nos.	10	12	22	32	42
Each	$3.00	2.50	4.00	6.00	15.00

Pennsylvania.....dis 40&10
Nos. 1 2 3 00
₱ doz. $24.00 28.00 36.00 28.00
Miles' Challenge..Nos. 1 2
₱ doz..$22.00 30.00 40.00—dis 45&45&10 %
Home No. 1.....$26 ₱ doz, dis 55&10 %
Draw Cut..Nos.. 5 2 6 8
Each....$50.00 75.00 80.00 225.00—dis 20 @ 25 %
Beef Shavers (Enterprise Mfg. Co.)....dis 20&10 @ 30 %
Chadborn's Smoked Beef Cutter.....₱ doz, $66.00

Mincing Knives.
Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Lothrop's.....dis 20&10 %
Smith's. ₱ doz, Single, $2.00; Double, $3....dis 40@45 %
Knapp & Cowles.....dis 50&10@60 %

Molasses Gates.—Stebbins' Pat..dis 70@70 & 7½ %
Stebbins' Genuine.....dis 60&10&10 %
Stebbins' Tinned Ends.....dis 40&10 %
Chase's Hard Metal.....dis 50&10 %
Bush's.....dis 20 %
Lincoln's Pattern.....dis 66⅔&10 %
Weed's.....dis 20&10 %
Goss Nos.. 1 2 3 4
$7.00 8.00 9.00 10.00. ₱ doz, dis 60&10&10 %

Money Drawers.—₱ doz., $18 @ $20.

Muzzles.—Safety, ₱ doz. $3.....dis 25 %

Nails......See Trade Report
Wire Nails, list July 14, '87.....dis 60&10&10@70 %
Wire Nails, Standard Penny.....₱ keg, $2.70 @ $2.80
Wire Carpet Nails.....See Tacks

Nail Puller.—Curtiss Hammer....₱ doz $9.00 net
Giant, No. 1.....₱ doz $30.00, dis 10 %
Pelican.....₱ doz $9.00, dis 25 %
Boss.....₱ doz $30, dis 30 %

Nail Sets.—Square.....₱ gro., $4.00 @ $4.25
Round.....₱ gro., $3.25
Cannon's Diamond Point.....₱ gro. $12 dis 20 %

Nut Crackers.
Table (Humason & Beckley Mfg. Co.).....dis 40 %
Blake's Pattern.....₱ doz $2.00, dis 10 %
Turner & Seymour Mfg. Co.....dis 50 %

Nuts and Washers.
Size.... ¼ 5-16 ⅜ ½ ⅝ ¾ 1
Washers.... 7 5¾ 4¾ 4 3⅛ 3⅛ 3⅛
Nuts, all kinds, 5¢ off list.
In lots less than 100 ℔, ₱ ℔, add ½¢, 1 ℔ boxes add 1¢ to list.

Oakum.
Government.....₱ ℔ 8½¢
U. S. Navy.....₱ ℔ 7¾¢
Navy.....₱ ℔ 7 ¢

Oilers.—Zinc and Tin.....dis 65 @ 65&10 %
Brass and Copper.....dis 50&10@50&10&5 %
Malleable, Hammers' Improved, No 1, $3.00; No. 2, $4.00; No. 3, $4.40 ₱ doz.....dis 10 @ 10&10 %
Malleable, Hammers, Old Pattern, same list....dis 40 %
Prior's Patent or "Paragon" Zinc.....dis 60&10&10 %
Prior's Patent or "Paragon" Brass.....dis 50 %
Olmstead's Tin and Zinc.....dis 60 %
Olmstead's Brass and Copper.....dis 50 %
Broughton's Zinc.....dis 60 %
Broughton's Brass.....dis 50 %

Packing, Steam.
Rubber—
Standard.....dis 60&10 @ 50&10&10 %
Extra.....dis 50&10 @ 60 %
N. Y. B. & P. Co., Standard.....dis 50&10&5 %
N. Y. B. & P. Co., Empire.....dis 70 %
N. Y. B. & P. Co., Salamander.....₱ ℔ 65¢, dis 30 %
Jenkins' Standard.....₱ ℔ 80¢, dis 35 %
Miscellaneous—
American Packing.....10¢ @ 11¢ ₱ ℔
Russia Packing.....14¢ ₱ ℔
Italian Packing.....13 @ 14¢ ₱ ℔
Cotton Packing.....15 @ 17¢ ₱ ℔
Jute.....7 @ 8¢ ₱ ℔

Padlocks.—See Locks.

Pails.
Galvanized Iron—
Quarts..... 10 12 14
Hill's Light Weight, ₱ doz.....$2.75 3.00 3.25
Hill's Heavy Weight, ₱ doz..... 3.00 3.25 3.75
Whiting's..... 2.75 3.00 3.25
Sidney Shepard & Co ..... 2.67 .... 3.23
Iron Clad..... 2.75 3.00 3.25
Fire Buckets..... 2.75 3.25 3.50
Buckets, see Wall Buckets
Indurated Fibre Ware—
Star Pails, 12 qt.....₱ doz $4.50
Fire, Stable and Milk, 14 qt.....₱ doz $5.50

Pencils. Faber's Carpenters'.....high list, dis 50 %
Faber's Round Gilt.....₱ gro $5.25 net
Dixon's Lead.....₱ gro $4.50 net
Dixon's Lumber.....₱ gro $5.75 net
Dixon's [illegible].....dis 40&10 %

Picks.
Railroad, 5 to 6, $12.00; 6 to 7, $13.....dis 60 @ 60&10 %
Adze Eye, 5 to 6, $12.00; 6 to 7, $13.....dis 60 @ 60&10 %

Picture Nails.
Brass Head, Sargent's list.....dis 50&10&10 %
Brass Head, Combination list.....dis 50&10 %
Porcelain Head, Sargent's list.....dis 50&10&10 %
Porcelain Head, Combination list.....dis 40&10 %
Miles' Patent.....dis 40 %

Pinking Irons......₱ doz 65¢ net

Pipe, Wrought Iron.—List March 23, 1887.
1¼ and under, Plain.....dis 50 %
1¼ and under, Galvanized.....dis 42½ %
1½ and over, Plain.....dis 60 %
1½ and over, Galvanized.....dis 50 %
Boiler Tubes, Iron.....dis 50 @ 52½ %

Planes and Plane Irons.
Wood Planes—
Moulding.....dis 50 @ 50&5 %
Bench, First Quality.....dis 60 @ 60&5 %
Bench, Second Quality.....dis 60&10 %
Bailey's (Stanley R. & L. Co.).....dis 30&10 %
Iron Planes—
Bailey's (Stanley R. & L. Co.)..dis 30&10@30&10&5 %
Miscellaneous Planes (Stanley R. & L. Co.)dis 20&10 %
Victor Planes (Stanley R. & L. Co.).....dis 20& 10 %
Steer's Iron Planes.....dis 35 @ 35&5 %
Meriden Mal. Iron Co.'s.....dis 30&10@30&10&10 %
Davis's Iron Planes.....dis 30&10@30&10&10 %
Birmingham Plane Co.....dis 50@50&5 %
Gage Tool Co.'s Self-Setting.....dis 20 %
Plane Irons—
Plane Irons.....dis 20&10 %
Plane Irons, Butcher's.....$5.00 @ $5.25 to £
Plane Irons, Buck Bros.....dis 30 %
Plane Irons, Middlesex Mfg. Co., "Baldwin Iron," Single and Cut.....dis 20 @ 25 %
Double.....dis 33⅓ @ 40 %
L. & L. J. White.....dis 25 %

Pliers and Nippers.
Button's Patent.....dis 30&10 @ 40 %
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21.00 ₱ doz dis 30&10@33⅓ %
Humason & Beckley Mfg. Co.....dis 50@50&10 %
Gas Pliers.....dis 60 %
Gas Pliers, Custer's Nickel Plated.....dis 60&5 %
Eureka Pliers and Nippers.....dis 40 %
Russell's Parallel.....dis 25 %
P. S. & W. Cast Steel.....dis 50 %
P. S. & W. Tinners' Cutting Nippers....add 6 % dis 10 %
Carew's Pat. Wire Cutters.....dis 30 %
Morrill's Parallel, per doz., $13.....dis 30&5 %
Cronk's 8 in., $15; 10 in., $21.....dis 40 %

Plumbs and Levels.
Regular List.....dis 70&10@70&10&10 %
Disston's.....dis 45&10 %
Pocket Levels.....dis 70&10@70&10&10 %
Davis Iron Levels.....dis 30 %
Davis' Inclinometers.....dis 10&10 %

Poppers, Corn.
Round or Square, 1 qt.....₱ gro $10.50 @ $12
Round or Square, 2 qt.....₱ gro $23.50 @ $24

Post Hole and Tree Augers and Diggers.
Samson Post Hole Digger.....₱ doz $36.00, dis 25&10 %
Fletcher Post Hole Augers.....₱ doz $36.00, dis 20 %
Eureka Diggers.....₱ doz $16 @ $17
Leed's.....₱ doz $8.00 @ $9.00
Vaughan's Post Hole Auger, per doz, $24.00... dis 40 %
Kohler's Little Giant.....₱ doz $18.00
Kohler's Hercules.....₱ doz $16.00
Kohler's New Champion.....₱ doz $9.00
Schneidler.....₱ doz $18
Ryan's Post Hole Diggers.....₱ doz $24
Cronk's Post Bars.....₱ doz $60, dis 50&5 @ 50&10 %
Gibb's Post Hole Digger, ₱ doz $30....dis 40 @ 40&10 %

Potato Parers.
White Mountain.....₱ doz $5.00 @ 5.50
Antrim Combination.....₱ doz $8.00
Hoosier.....₱ doz $13.50

Pruning Hooks and Shears.
Disston's Combined Pruning Hook and Saw, ₱ doz $18.00.....dis 20&10 %
Disston's Pruning Hook.....₱ doz $12.00, dis 20&10 %
E. S. Lee & Co.'s Pruning Tools.....dis 40 %
Pruning Shears, Henry Pat...₱ doz $3.75 @ $4.00 net
Henry's Pruning Shears.....₱ doz $4.25 @ $4.50 net
Wheeler, M. & C.'s Combination...₱ doz $12, dis 20 %
Dunlap's Saw and Chisel.....₱ doz $8.50, dis 30 %
J. Mallinson & Co.....No. 1, $5.25; No. 2, $7.25

Pulleys.—Hot House, Awning, &c.....dis 60&10 %
Japanned Screw.....dis 60&10 %
Brass Screw.....dis 60&10 %
Japanned Side.....dis 66⅔&10 %
Japanned Clothes Line.....dis 60&10 %
Empire Sash Pulley.....dis 55 @ 60 %

Hay Fork, Solid Eye, $4.00; Swivel, $4.50 { dis 50&10 @ 50&10&5 %

Hay Fork, "Anti-Friction," 5 in. Solid, $5.70....dis 50 %
Hay Fork, "F" Common and Pat. Bushed.....dis 20 %
Hay Fork, Tarbox Pat. Iron.....dis 20 %
Hay Fork, Reed's Self-Lubricating.....dis 60 %
Shade Rack.....dis 45 %
Tackle Blocks.....See Blocks

Pumps.—Cistern, Best Makers.....dis 50&10&60 %
Pitcher Spout, Best Makers...dis 60&10 @ 60&10&10 %
Pitcher Spout, Cheaper Goods..dis 70&5 @ 70&10&5 %

Punches.
Saddlers' or Drive, good quality.....₱ doz 60¢ @ 65¢
Bemis & Call Co.'s Cast Steel Drive.....dis 50&5 %
Bemis & Call Co.'s Springfield Socket.....dis 50&5 %
Spring, good quality.....₱ doz $2.50 @ $2.60
Spring, Leach's Patent.....dis 15 %
Bemis & Call Co.'s Spring and Check.....dis 40 %
Solid Tinners'.....₱ doz $1.44, dis 55 %
Tinners' Hollow Punches.....dis 20&2 %

Rail.
Sliding Door, Wrt. Brass ₱ ℔ 35¢, dis 20 @ 20&5 %
Sliding Door, Bronzed Wrt. Iron.....₱ foot 7¢
Sliding Door Iron, Painted....₱ foot 4¢, dis 20&10&5 %
Barn Door, Light....Inch. ⅜ ½ ⅝
Per 100 feet..... $2.50 3.00 4.40—dis 10 %
B. D. for N. E. Hangers—

	Small.	Med.	Large
Per 100 feet	$2.15	2.70	3.25 net

Terry's Wrought Iron, ₱ foot.....4½¢ @ 5¢
Victor Track Rail, 7¢ ₱ foot.....dis 50&2 %

Rakes.
Cast Steel.....dis 65&5 @ 70 %
Malleable.....dis 70 @ 70&5 %
Gibbs Lawn Rake.....$12, dis 40 %
Canton Lawn Rake.....$9, dis 40 %
Ft. Madison Prize Bow Brace and Peerless..dis 65&5 %
Fort Madison Steel Tooth Lawn Rake, $6.....dis 25 %

Razors.—J. R. Torrey Razor Co.....dis 20%
Wostenholme and Butcher.....$10 to £, dis 10 %

Razor Strops.
Genuine Emerson.....dis 60 @ 60&5 %
Imitation Emerson.....₱ doz $2.00, dis 20&10&5 %
Torrey's.....dis 20 %
Badger's Belt and Combination.....₱ doz $2
Lamont Combination.....₱ doz $4

Rivets and Burrs.
Copper.....dis 50, with Jobbers' Extras.
Iron, list November 17, 1887.....dis 50 %

Rivet Sets......dis 50&2 @ 50&10 %

Rods.—Stair, Brass.....dis 20&2 %
Stair, Black Walnut.....₱ doz 40¢

Rollers.
Barn Door, Sargent's list.....dis 60&10&10 %
Acme (Anti-Friction).....dis 55 %
Union Barn Door Roller.....dis 70 %

Rope.—Manufacturers' prices for large lots.

Manila	⅝ inch and larger	₱ ℔ 16½¢ net
Manila	¾ inch	₱ ℔ 11½¢ net
Manila	⅞ and 5-16 inch	₱ ℔ 11½¢ net
Manila Tarred Rope		₱ ℔ 10 ¢ net
Manila, Hay Rope		₱ ℔ 10½¢ net
Sisal	⅝ inch and larger	₱ ℔ 9¾¢ net
Sisal	¾ inch	₱ ℔ 10½¢ net
Sisal	⅞ and 5-16 inch	₱ ℔ 10½¢ net
Sisal, Hay Rope		₱ ℔ 9¾¢ net
Sisal, Tarred Rope		₱ ℔ 9½¢ net
Sisal, Medium Lath Yarn		₱ ℔ 8¾¢ net

Dis 1½ % for cash in 10 days.

Cotton Rope.....₱ ℔ 15 @ 18¢ net
Jute Rope.....₱ ℔ 7¢

Rules.
Boxwood.....dis 80&10 @ 80&10&10 %
Ivory.....dis 50 @ 55&10 %

Sad Irons.
From 4 to 10, at factory.....₱ 100 ℔ $2.75 @ $2.85
Self-Heating.....₱ doz. $9.00 net
Self-Heating, Tailors'.....₱ doz. $18.00 net
Gleason's Shield and Toilet.....dis 25 %
Mrs. Pott's Irons.....dis 40@40&5 %
Enterprise Star Irons, new list, July 20, 1883....dis 40 %
Combined Fluter and Sad Iron...₱ doz. $15.00, dis 15 %
Fox Reversible, Self-Fluter.....₱ doz., $24.00 net
Chinese Laundry (N. E. Butt Co.).....8½¢, dis 15 %
New England.....5¢, dis 15 %

Sand and Emery Paper and Cloth.
List April 19, 1886.....dis 20@20&5 %
Sibley's Emery and Crocus Cloth.....dis 30 %

Sash Cord.
Common.....₱ ℔, 10¢ @ 11¢
Patent, good quality.....₱ ℔, 13¢ @ 13½¢
White Cotton Braided, fair quality.....₱ ℔ 28¢ @ 29¢
Common Russia Sash.....₱ ℔ 13½¢
Patent " " .....₱ ℔ 15¢
Cable Laid Italian " .....₱ ℔ 22¢ @ 23¢
India Cable Laid " .....₱ ℔ 13¢
Silver Lake, A Quality, White.....50¢, dis 10&10&5 %
Silver Lake, A Quality, Drab.....55¢, dis 10&10&5 %
Silver Lake, B Quality, White.....60¢, dis 20&10&5 %
Silver Lake, B Quality Drab.....60¢, dis 20&10&5 %
Silver Lake, C Quality, White only!.....37¢ @ 38¢
Sylvan Spring, Extra Braided, White.....34¢
Sylvan Spring, Extra Braided, Drab.....30¢
Semper Idem, Braided, White.....30¢
Egyptian, India Hemp, Braided.....25¢
Samson, Braided, White Cotton....50¢ dis 30 @ 30&5 %
Samson, Braided, Drab Cotton....55¢ dis 30 @ 30&5 %
Samson, Braided Italian Hemp....55¢ dis 30 @ 30&5 %
Samson Braided Linen.....80¢ dis 30 @ 30&5 %

Sash Locks.
Clark's No. 1, $10.00; No. 2, $8.00 ₱ gross.....dis 33⅓ %
Ferguson's.....dis 33⅓ %
Morris and Triumph, list Aug. 16, 1886.....dis 60&2 %
Victor.....60&10&2 %
Walker's.....dis 10 %
Attwell Mfg. Co.....dis 25 @ 33⅓ %
Reading.....dis 66⅔&10 @ 66⅔&10&10 %
Hammond's Window Springs.....dis 40 %
Common Sense, Jap'd. Cop'd and Br'zed..₱ gross $4.50
Common Sense, Nickel Plated.....₱ gross $16.00
Universal.....dis 30 %
Kempshall's Gravity.....dis 60 %
Kempshall's Model.....dis 60@60&10 %
Corbin's Daisy, list February 15, 1886.....dis 70 %
Payson's Perfect.....dis 50&10&5 @ 60 %
Hugunin's New and Improved Adjustable Sash Balances, list Jan. 5, 1887.....dis 25&7&2 %
Hugunin's New Sash Locks. list Jan. 5, '87.dis 25&5&2 %
Stoddard "Practical".....dis 10 %
Ives Patent.....dis 55 @ 55&5 %
Lieseche's Nos. 100 & 110 ₱ gro. $8; 105, $10.dis 20&10 %
Davis, Bronze, Barnes Mfg. Co.....dis 50 %

Sash Weights.
Solid Eyes.....₱ ton. $25

Sausage Stuffers or Fillers.
Miles' "Challenge".....₱ doz. $20, dis 50@50&5 %
Perry.....₱ doz. No. 1, $15: No. 0, $21, dis 50@50&5 %
Draw Cut No. 4.....each, $30.00, dis 30 %
Enterprise Mfg Co.....dis 20&10 @ 30 %
Oliver's.....dis 40&10 %

Saws.
Disston's Circular....dis 45@45&5 %) Extras some-
Disston's Cross Cuts..dis 45@45&5 %) times given by
Disston's Hand.....dis 25@25&5 %) jobbers.
Atkins' Circular.....dis 50 %
Atkins' Silver Steel Diamond X Cuts.....₱ foot 75 ¢
Atkins' Concave Tooth Dexter X Cuts.....₱ foot 55 ¢
Atkins' Special Steel Diamond X Cuts.....₱ foot 32 ¢
Atkins' Champion and Electric Tooth X Cuts.....₱ foot 30 ¢
Atkins' Hollow Back X Cuts.....₱ foot 21 @ 22¢
Atkins' Shingle, Mulay, Drag, &c.....dis 30 @ 45 %
W. M. & C., Hand.....dis 30&5 @ 30&10 %
W. M. & C. Champion X Cuts. Regular ₱ foot .24¢@26¢
W. M. & C. X Cuts. Thin Back.....₱ foot 27¢@29¢
Peace Circular and Mill.....dis 45&10 %
Peace Hand Panel and Rip....dis 20&10 @ 20&10&10 %
Peace Cross Cuts, Standard.....₱ foot 25¢
Peace Cross Cuts, Thin Back.....₱ foot 27¢@28¢
Richardson's Circular and Mill.....dis 45 @ 45&10 %
Richardson's X-Cuts, No. 1, 30¢; No. 2, 27¢; No. 3, 24¢
Hack Saws—
Griffin's Hack Saws, complete.....dis 40&10 @ 50 %
Griffin's Hack Saw, Blades only.....dis 40&10 @ 50 %
Star Hack Saws and Blades.....dis 25 %
Diamond Hack Saws and Blades.....dis 25 %
Eureka and Crescent.....dis 25 %

Saw Frames.
White Vermont.....₱ gro $9 @ $10
Red, Polished, and Varnished....₱ doz $1.50, dis 25 %

Saw Sets.
Stillman's Genuine....₱ doz $5.00 and $7.75, dis 40&5 %
Stillman's Imita..₱ doz $3.25and$5.25,dis40&5@40&10%
Common Lever.....₱ doz $2.00, dis 40&5 %
Morrill's No. 1, $15.00; Nos. 3 & 4, $24....dis 40&10@50%
Leach's.....No. 0, $8.00; No. 1, $15.00, dis 15 @ 20 %
Nash's.....dis 20&10 @ 20&10&10 %
Hammer, Hotchkiss.....$5.50, dis 10 %
Hammer, Bemis & Call Co.'s new Patent....dis 30&5 %
Bemis & Call Co.'s Lever and Spring Hammer..dis 30&5 %
Bemis & Call Co.'s Plate.....dis 10 %
Bemis & Call Co.'s Cross Cut.....dis 12½ %
Aiken's Genuine.....$13.00, dis 50&10 %
Aiken's Imitation.....$7.00, dis 55&5 %
Hart's Patent Lever.....dis 20 %
Disston's, Star, $9. No. 15, $5.50, dis 20&10@50&10&10 %
Atkins' Lever.....per doz No. 1, $6.00; No. 2, $9.60
Atkins' Criterion.....per doz $7.00 @ $7.50
Croissant (Keller), No. 1, $15.00; No. 2, $24.00, dis 33⅓&10 %

Saw Tools.
Atkins Perfection....$15.00; Excelsior $6.00 ₱ doz.

Scales.
Hatch, Counter, No. 171, good quality.....₱ doz $21
Hatch, Tea, No. 161.....₱ doz $6.75 @ $7.00
Union Platform, Plain.....$2.30 @ 2.35
Union Platform, Striped.....$2.40 @ 2.50
Chatillon's Grocers' Trip Scales.....dis 50 %
Chatillon's Eureka.....dis 25 %
Chatillon's Favorite.....dis 40 %
Family, Turnbull's.....dis 30@30&10 %

Scale Beams.
Scale Beams. List of Jan. 12, 32..dis 50&10@50&10&5 %
Scale Beams. Custer.....dis 30@33⅓ %
Chatillon's No. 1.....dis 40 %
Chatillon's No. 2.....dis 50 %

Scrapers.
Adjustable Box Scraper (S. R. & L. Co.), $6.50, d's 30&10 %
Box, 1 Handle.....₱ doz $4.00, dis 10 %
Box, 2 Handle.....₱ doz $6.00, dis 10 %
Defiance Box and Ship.....dis 20&10 %
Foot.....dis 50&10@60 %
Ship, Common.....₱ doz $3.50 net
Ship, Providence Tool Co.....dis 10 %

Screen Window and Door Frames.
Porter's Pat. Window and Door Frame...dis 33⅓&10 %
Screen Corner Irons. Warner's....dis 33⅓ @ 33⅓&10 %
Stearns' Frames and Corners.....dis 25&10 %

Screw Drivers.
Douglas Mfg Co.....dis 20&10&10 %
Disston's.....dis 45&10 %
Disston's Patent Excelsior.....dis 45&10 %
Buck Bros.....dis 30 %
Stanley R. & L. Co.'s Varnished Handles....dis 65&10 %
Stanley R. & L. Co.'s Black Handles.....dis 60&10 %
Sargent & Co.'s No. 1 Forged Blade....dis 70&10&10 %
Sargent & Co.'s No. 20.....dis 66⅔&10&10 %
Sargent & Co.'s Nos. 40 & 30, Cast Steel.....dis 60&10 %
Sargent & Co.'s No. 60, Round Blade.....dis 70&10 %
Knapp & Cowles' No. 1.....dis 60&20 @ 70 %
Knapp & Cowles' No. 1 Extra.....dis 60 @ 60&10 %
Knapp & Cowles' No. 00 & 4.....dis 50&5 @ 50&10 %
Stearns'.....dis 25&10&5 %
Gay & Parsons.....dis 35 %
Champion.....dis 25 %
Clark's Patent.....dis 30 @ 33⅓ %
Crawford's Adjustable.....dis 30 %
Eilrich's Socket and Ratchet.....dis 25 @ 25&10 %
Allard's Spiral, new list.....dis 25 %
Kolb's Common Sense.....₱ doz $6, dis 25&10 %

Syracuse Screw-Driver Bits.....dis 30 & 30&5 %
Screw Driver Bits.....₱ doz. 50¢ @ 75¢
Screw Driver Bits, Parr's.....₱ gro. 6.25
Fray's Hol. Hdle. Sets, No. 3, $12.....dis. 25 @ 25 & 10 %
P. D. & Co.'s, all Steel.....dis 50 %

Screws
Wood Screws—List, Brass, Jan 27; Iron, July 1, 1887
Flat Head Iron.....dis 70 %
Round Head Iron.....dis 65 %
Flat Head Brass.....dis 65 %
Round Head Brass.....dis 60 %
Flat Head Bronze.....dis 65 %
Round Head Bronze.....dis 60 %
} Ex. 10 % often given by jobbers.

Machine—
Flat Head, Iron.....dis 55 %
Round Head, Iron.....dis 50 %
Bench and Hand—
Bench, Iron.....dis 55&10 @ 55&10&10 %
Bench, Wood, Beech.....₱ dos $2.25
Bench, Wood, Hickory.....dis 20&10 %
Hand, Wood.....dis 25&10 @ 25&10&5 %
Lag, Blunt Point.....dis 70 %
Coach and Lag, Gimlet Point.....dis 66⅔@66⅔&5 %
Bed.....dis 25&5 %
Hand Rail, Sargent's.....dis 66⅔&10 %
Hand Rail, Humason, Beckley & Co.'s..dis 70&10@75 %
Hand Rail, Am. Screw Co.....dis 75 %
Jack Screws, Millers Falls list.....dis 50 @ 50&5 %
Jack Screws, P. S. & W.....dis 35 %
Jack Screws, Sargent.....dis 60&10 @ 60&10&5 %
Jack Screws, Stearns'.....dis 40 @ 40&10 %

Scroll Saws.
Lester, complete, $10.00.....dis 25 %
Rogers, complete, $4.00.....dis 25 %

Scythe Snaths.....dis 50&10 @ 60 %

Shears.
American (Cast) Iron.....dis 75&10 @ 75&10&5 %
Pruning.....See Pruning Hooks and Shears
Barnard's Lamp Trimmers.....₱ doz $3.75
Tinners'.....dis 20&2 %
Seymour's, List, Dec. 1881 dis 60&10&10@60&10&10&5 %
Heinsch's, List, Dec. 1881. dis 60&10&10@60&10&10&5 %
Heinsch's Tailor's Shears.....dis 33⅓ %
First quality C. S. Trimmers.....dis 80&80&10 %
Second quality C. S. Trimmers. dis 80&10@80&10&10 %
Acme Cast Shears.....dis 10&10 %
Diamond Cast Shears.....dis 10 %
Clipper.....dis 10&10 %
Victor Cast Shears.....dis 75&10@75&10&5 %
Howe Bros. & Hulbert, Solid Forged Steel..dis 40 %
Cleveland Machine Co., Solid Steel Forged.....dis 70 %

Sheaves.
Sliding Door—
M. W. & Co., list Jan. 1, 1887. ....dis 50&10 @ 60&5 %
R. & E., list Dec. 18, 1885.....dis 55&2 %
Corbin's list.....dis 60&10&2 %
Patent Roller.....dis 60&10&2 %
Patent Roller, Hatfield's.....dis 75 %
Russell's Anti-Friction, list Dec. 18, 1885..dis 60&2
Moore's Anti-Friction.....dis 60
Sliding Shutter—
R. & E. list Dec. 18, 1885.....dis 60&10&2 %
Sargent's list.....dis 60&10 %
Reading list.....dis 60&10&10 %

Ship Tools.
L. & I. J. White.....dis 20&5 %
Albertson Mfg. Co.....dis 25 %

Shoes, Horse, Mule, &c.
Horse—
Burden's, Perkins', Phœnix, at factory.....$4.00
Mule—Add $1 ₱ keg to above prices.
Ox, Wrought—
Ton lots.....₱ ℔ 9¢
1000 ℔ lots.....₱ ℔ 9½¢
500 ℔ lots.....₱ ℔ 10¢

Shot.—*(Eastern prices, 2¢ off, cash, 5 days.)*
Drop, ₱ bag, 25 ℔.....$1.50
Drop, ₱ bag, 5 ℔.....35
Buck and Chilled, ₱ 25-℔ bag.....$1.75
Buck and Chilled, ₱ 5-℔ bag.....40
(Western prices, 2½ off, cash, 5 days.)
Drop Shot, ₱ bag, 25 ℔.....
Drop Shot, ₱ bag, 5 ℔.....
Buck and Chilled Shot, ₱ bag, 25 ℔.....
Buck and Chilled Shot, ₱ bag, 5 ℔.....
} See Trade Report.

Shovels and Spades.
Ames' Shovels, Spades, &c., list Nov. 1, 1885....dis 20 %
NOTE.—Jobbers frequently give 5 @ 7½ % extra on above.
Griffith's Black Iron.....dis 50&10 %
Griffith's C. S.....dis 50&10@60&5 %
Griffith's Solid Cast Steel R. R. Goods.....dis 20 %
Old Colony (Sanford Fork & Tool Co).....dis 20 %
St. Louis Shovel Co.....dis 15 @ 15&7½ %
Hussey, Binns & Co.....dis 15 @ 25 %
Hubbard & Co.....dis 20@20&7½ %
Lehigh Mfg. Co.....dis 50&10 %
Payne Pettebone & Son, list January, 1886....dis 30 %
Remington's (Lowman's Patent).....dis 30&10 @ 40 %
Rowland's, Black Iron.....dis 50&10 %
Rowland's Steel.....dis 60 @ 60&5 %

Shovels and Tongs.
Iron Head.....dis 60&10@60&10&5 %
Brass Head.....dis 60&10&10 %

Skeins, Thimble.
Western list.....dis 75 @ 75&10 %
Columbus Wrt. Steel, list Nov. 1, 1887.....dis 20 %

Sieves.
Buffalo Metallic, S. S. & Co., new list.....dis 50&25 %
Barler Flour Sifters.....₱ doz $2.00
Smith's Adjustable Sifters.....₱ doz $2.25
Smith's Adjustable Milk Strainer.....₱ doz $2.00
Smith's Adjustable F. & C. Strainer.....₱ doz $1.75

Sieves, Wooden Rim—	Iron.	Plated.
Mesh 18, Nested, ₱ doz.	70¢	90¢
Mesh 20, Nested, ₱ doz.	85¢	$1.00
Mesh 24, Nested, ₱ doz.	$1.00	1.10

Slates.—School, by case.....dis 40&10 %

Snaps, Harness, &c.
Anchor (T. & S. Mfg Co.).....dis 65 %
Fitch's (Bristol).....dis 50&10 %
Hotchkiss.....dis 10 %
Andrews.....dis 50 %
Sargent's Patent Guarded.....dis 70&10&10 %
German, new list.....dis 40&10 %
Covert.....dis 50&2 %
Covert, New Patent.....dis 50&5&2 %
Covert New R. E.....dis 60&2 %
Covered Spring.....dis 60&10&10 %

Soldering Irons.
Covert's Adjustable. list Jan. 1, 1886.....dis 35&2 %

Spoke Shaves.—Iron.....dis 45 %
Wood.....dis 30 %
Bailey's (Stanley R. & L. Co.).....dis 40&10 %
Stearns'.....dis 20&10 @ 30 %

Spoke Trimmers.
Bonney's.....₱ doz $10.00, dis 50 %
Stearns'.....dis 20&10 %
Ives'.....No. 1, $15.00; No. 2, $12.00 ₱ doz, dis 55&10 %
Douglass'.....₱ doz $9.00, dis 20 %

Spoons and Forks.
Tinned Iron—
Basting, Central Stamping Co.'s list. dis 70@70&10 %
Solid Table and Tea, Central Stamping Company's list.....dis 70@70&10 %
Buffalo, S. S. & Co.....dis 33⅓&2 %

Silver-Plated—
Meriden Brit. Co., Rogers.....dis 50&5 %
C. Rogers & Bros.....50&5 %
Rogers & Bro.....50&5 %
Reed & Barton.....dis 50&5 @ 50&10&5 %
Wm. Rogers Mfg. Co.....dis 50&10 @ 60 %
Simpson, Hall, Miller & Co.....dis 50&10&5 @ 60 %
Holmes & Edwards Silver Co.....dis 50&10&5@60 %
H. & E. Silver Co. Mexican Silver.....dis 50&5 %
H. & E. Silver Co., Durham Silver.....dis 50&5 %
German Silver.....dis 50 @ 50&5 %
German Silver, Hall & Elton.....dis 40&5 %
Nickel Silver.....dis 50&5@50&10&5 %, cash
Britannia.....dis 55 %

Springs.
Elliptic, Concord, Platform and Half Scroll.....
.....dis 60 @ 60&5 %
Cliff's Bolster Springs.....dis 20 %

Squares.
Steel and Iron.....
Nickel-Plated.....dis 70&10 %
Try Square and T Bevels.....dis 60&10&10 @ 70 %
Disston's Try Square and T Bevels.....dis 45&10 %
Winterbottom's Try and Miter.....dis 30&10 %

Staples.
Fence Staples, Galvanized.....₱ ℔, 4 @ 4¼¢
Fence Staples, Plain.....₱ ℔, 3 @ 3¼¢

Steelyards......dis 40&10@50&5 %

Stocks and Dies.
Blacksmith's, Waterford Goods....dis 30&5 @ 30&10 %
Lightning Screw Plate.....dis 25 @ 30 %
Reece's New Screw Plates.....dis 33⅓ @ 33⅓&5 %

Stone.
Hindostan No. 1, 3¢; Axe, 3¼¢; Slips No. 1, 5¢.
Sand Stone.....₱ ℔, 2¢
Washita Stone, Extra.....₱ ℔, 1 @ 22¢
Washita Stone, No. 1.....₱ ℔, 15 @ 16¢
Washita Stone, No. 2.....₱ ℔, 11 @ 12¢
Washita Slips, No. 1, Extra.....₱ ℔, 40 @ 42¢
Washita Slips, No. 1.....₱ ℔, 30 @ 32¢
Arkansas Stone, No. 1, 4 to 6 in.....₱ ℔, $1.35
Arkansas Stone, No. 1, 6 to 9 in.....₱ ℔, $1.75
Turkey Oil Stone.....4 to 8 in., ₱ ℔, 40¢
Turkey Slips.....₱ ℔, $1.00 @ $1.50
Lake Superior, Chase.....₱ ℔, 16¢
Lake Superior Slips, Chase.....₱ ℔, 31@32¢
Seneca Stone, Red Paper Brand, ₱ ℔.....18 @ 20¢
Seneca Stone, High Rounds, ₱ ℔.....20 @ 25¢
Seneca Stone, Small Whets, ₱ gro.....$24.00

Stove Polish.
Joseph Dixon s.....₱ gro $6.00, dis 10 %
Gem.....₱ gro $4.50, dis 10 %
Gold Medal.....₱ gro $6.00, dis 25 %
"Mirror".....₱ gro $6.00, dis — %
Lustro.....₱ gro $4.75 net
Ruby.....₱ gro $3.75 net
Rising Sun, 5 gro. lots.....₱ gro $5.50
Dixon's Plumbago.....₱ ℔ 8¢ net
Boynton's Noon Day, ₱ gro.....$5.00
Parlor Pride Stove Enamel.....₱ gross, $13
Yates' Liquid, 2 3 5 10 gal. cans
₱ gal.. $0.90 .80 .70 .60
Yates Standard Paste Polish, 10-lb cans, per lb., 15 ¢
Jet Black.....₱ gro $3.50
Japanese.....₱ gro $3.50
Fireside.....₱ gro $2.50

Tacks, Brads, &c.
List Jan 2, 1888.
American Iron Carpet Tacks.....dis 72½&10&2 %
Steel Carpet Tacks.....dis 72½&10&2 %
Swedes Iron Carpet Tacks.....dis 72½&10&2 %
American Iron Cut Tacks.....dis 70&10&2 %
Swedes Iron Tacks.....dis 67½&10&2 %
Swedes Iron Upholsterers' Tacks...dis 67½&10&2 %
Tinned Swedes Iron Tacks.....dis 67½&10&2 %
Tin'd Sw'des Iron Uphol'ers' Tacks.dis 67½&10&2 %
Gimp and Lace Tacks.....dis 67½&10&2 %
Tinned Gimp and Lace Tacks.....dis 67½&10&2 %
Swedes Iron Trimmers' Tacks....dis 67½&10&2 %
Swedes Iron Miners' Tacks.....dis 67½&10&2 %
Swedes Iron Bill Posters' or Railroad Tacks.....
.....dis 67½&10&2 %
Swedes Steel Tacks, all kinds (Swedes Iron price list).....dis 72½&10&2 %
Copper Tacks.....dis 33⅓&10&2 %
Copper Finishing Trunk and Clout Nails.....
.....dis 33⅓&10&2 %
Finishing Nails.....dis 60&10&2 %
Trunk and Clout Nails.....dis 60&10&2 %
Tinned Trunk and Clout Nails.....dis 60&10&2 %
Basket Nails.....dis 60&10&2 %
Common and Patent Brads.....dis 60&10&2 %
Hungarian Nails.....dis 60&10&2 %
Chair Nails.....dis 60&10&2 %
Zinc Glaizers' Points.....dis 40&10&2 %
Cigar Box Nails.....dis 45&10&2 %
Picture-Frame Points.....dis 45&10&2 %
Looking-Glass Tacks.....dis 45&10&2 %
Leathered Carpet Tacks.....dis 45&10&2 %
Brush Tacks.....dis 45&10&2 %
Shoe Finders'.....List Jan. 2, 1888. dis 10 @ 10&5 %
Lining and Saddle Nails, List Jan. 1, 1886:
Silvered.....dis 30&10&10 %
Japanned.....dis 20&10&10 %
Double-pointed Tacks.....85 %
Wire Carpet Nails.....dis 50&10 %
Steel Wire Brads, R. & E. Mfg. Co.....dis 50&10 %

Extra 10 % often given.

Tap Borers.
Common and Ring.....dis 20&10 %
Ives' Tap Borers.....dis 33⅓&5 %
Enterprise Mfg. Co.....dis 20&10 @ 30 %
Clark's.....dis 33⅓ @ 35 %

Tapes, Measuring.—American.....dis 25&10 %
Spring.....dis 40 %
Chesterman's.....Regular list dis 25 @ 30 %

Thermometers.—Tin Case.....dis 80 @ 80&10 %

Thimble Skeins.—See Skeins.

Ties, Bale.
Steel Wire, Standard list.....dis 50&10&5 %

Tinners' Shears, &c.
Shears and Snips (P. S. & W.).....dis 20 @ 25 %
Punches—See Punches.
Snips, J. Mallinson & Co.....dis 33⅓%

Tinware.
Stamped, Japanned & Pieced, list Jan. 20, 1887.....
.....dis 70 @ 70&10&5 %

Tobacco Cutters.
Enterprise Mfg. Co. (Champion).....dis 20&10 @ 30 %
Wood Bottom.....₱ doz $5.00 @ $5.25
All Iron.....₱ doz $4.25
Nashua Lock Co.'s.....₱ doz $18.00, dis 50 @ 55 %
Millers'.....dis 55 %
Clipper (Sargent & Co.).....₱ doz $24, dis 50&10&10 %
Acme.....₱ doz $20.00, dis 40 %

Transom Lifters
Wollensak's Patent Iron Bronzed.....dis 50 %
Reiher's Bronzed Iron Rods list Jan. 1, 1887. dis 50&2 %
Reiher's Real Bronze or Nickel Plate. list Jan. 1, 1887.....dis 50&2 %
Excelsior.....dis 50&10&2 %
Shaw's.....dis 50&10 %
Payson's Universal.....dis 40 %
Crown and Star.....dis 50 %

Traps.
Game—
Newhouse.....dis 35 @ 40&5 %
Oneida Pattern.....dis 60&10&10 @ 70 %
Game, Blake's Patent.....dis 40&10&5 %
Mouse and Rat—
Mouse, Wood, Choker.....₱ doz holes. 11@12¢
Mouse, Round Wire.....₱ doz $1.50, dis 10 %
Mouse, Cage, Wire.....₱ doz $2.50, dis 10 %
Mouse, Catch-'em-alive.....₱ doz $2.50, dis 15
Mouse, "Bonanza".....₱ gross $10 net
Mouse, Delusion.....₱ gross $18.00, dis 15 %
Rat, "Decoy".....₱ gross $10.00, dis 10 %
Ideal.....₱ gross $10
Cyclone.....₱ gross $5.25
Hotchkiss Metallic Mouse, 5 hole traps....₱ doz 90¢
In full cases.....₱ doz 75¢

Trowels.
Lothrop's Brick and Plastering.....dis 25
Reed's Brick and Plastering.....dis 15 %
Disston's Brick and Plastering.....dis 25 @ 25&10 %
Peace's Plastering.....dis 25 %
Clement & Maynard's.....dis 20 %
Rose's Brick.....dis 10 @ 20 %
Brade's Brick.....dis 25 %
Worrall's Brick and Plastering.....dis 20
Garden.....dis 70 %

Triers.—Butter and Cheese.....dis 25 %

Trucks, Warehouse, &c.
B. & L. Block Co.'s list, 1882.....dis 40 %

Tubes, Boiler.—See Pipe

Twine.

	BC.	B.
No. 9, Flax Twine, ¼ and ½ ℔ Balls	23¢	31¢
No. 12, " " ¼ and ½ "	21½¢	30¢
No. 18, " " ¼ and ½ "	18½¢	29¢
No. 24, " " ¼ and ½ "	20¢	29¢
No. 36, " " ¼ and ½ "	17½¢	28¢
No. 2½, Mattrass, ¼ and ½ "		43¢
Chalk Line, Cotton, ½ ℔ Balls		25¢
Mason Line, Linen, ½ "		55¢
2-Ply Hemp, ¼ and ½ ℔ Balls (Spring Twine)		12¢
3-Ply Hemp, 1 ℔ Balls		12½¢
3-Ply Hemp, 1½ ℔ Balls		11½¢
Cotton Wrapping, 5 Balls to ℔		15¢ @ 18¢
2, 3, 4 and 5 Ply Jute, ½ ℔ Balls		9½¢
Wool		6½¢ @ 6¢
Paper		13¢ @ 14¢
Cotton Mops—6, 9, 12 and 15 ℔ to dos.		18¢

Vises.
Solid Box.....dis 50&10&5 @ 60 %
Parallel—
Fisher & Norris Double Screw.....dis 15&10 %
Stephens'.....dis 25 %
Parker's.....dis 20 @ 25 %
Wilson's.....dis 55 %
Howard's.....dis 40 %
Bonney's.....dis 40%
Millers Falls.....dis 40 @ 40&10 %
Trenton.....dis 40&5 @ 40&10 %
Merrill's.....dis 15@20 %
Sargent's.....dis 60&10&10 %
Backus and Union.....dis 40 %
Double Screw Leg.....dis 15&10 %
Prentiss.....dis 20&5 @ 25 %
Simpson's Adjustable.....dis 40 %
Saw Filers—
Bonney's, Nos. 2 & 3.....₱ dos $15.00, dis 40 %
Stearn's.....dis 33⅓&10 @ 33⅓&10&10 %
Stearn's Silent Saw Vises.....dis 33⅓ @ 35 %
Sargent's.....dis 60&10&10 %
Hopkins'.....₱ dos $17.50, dis 10 %
Reading.....dis 40&10 %
Wentworth.....dis 20&10 %
Combination Hand Vise.....₱ gro, $42.00
Cowell Hand Vises.....dis 20 %
Bauer's Pipe Vises.....dis 10 %

Wagon Boxes.
Per lb.....2½¢

Washer Cutters.
Smith's Patent.....₱ dos $12.00, dis 40&10&10 %
Johnson's.....₱ dos $11.00, dis 33⅓ %
Penny's.....₱ dos Pol. $14; Jap'd, $16..dis 55 %
Appleton's.....₱ dos $16.00, dis 60&10 %
Bonney's.....dis 30&10 %

Washers.—See Nuts and Washers.

Wedges.—Iron.....₱ ℔ 3½¢
Steel.....₱ ℔ 4 ¢

Well Buckets, Galvanized.
Hill's.....₱ doz., 12 qt., $4.25 : 14 qt., $5 25
Iron Clad.....₱ doz., 14 qt., $4.25 @ $4.50
Whiting's Flat Iron Band.....₱ doz $4.25 @ $4.50
Whiting's Wired Top.....₱ doz $4.00 @ $4.25

Well Wheels—8 in., $2; 10 in., $2.25; 12 in., $3.25

Wire.
Iron—
Market, Br. & Ann..Nos. 0 to 18.....dis 70&10@75 %
Market, Coppered, Nos. 0 to 18.....dis 70@70&10 %
Market, Galvanized, Nos. 0 to 18.....dis 65@65&10 %
Market, Tin d, Tinned list Nos. 0 to 18..dis 65@65&5 %
Stone Br. & Ann'd, Nos. 16 to 18....dis 72½@72½&5 %
Stone, Bright and Ann'd, Nos. 19 to 26..dis 75@75&5 %
Stone, Br. & Ann'd, Nos. 27 to 36..dis 75&10@75&10&5 %
Stone, Tin d, Tin'd list, Nos. 18 to 36..dis 70@70&10 %
Tinned Broom Wire, Nos. 18 to 24..dis 72½@72½&5 %
Galvanized Fence.....dis 65@65&5 %
Annealed Fence, Nos. 8 & 9.....dis 70@70&5 %
Annealed Grape, Nos. 10 to 14.....dis 70@70&5 %
Brass and Copper, list, Jan. 18, '84.....dis 15 @ 20 %
Barb Fence.....See Trade Report
Wire on Spools.....dis 5 %
Malin's Steel and Tinned Wire on Spools.....dis 50 %
Malin's Brass and Copper Wire on Spools.....dis 40 %
Cast Steel Wire.....dis 50 %
Stubs' Steel Wire.....$6.00 to £, dis 30 %
Steel Music Wire, Nos. 12 to 30.....55¢ ₱ ℔
Picture Wire.....dis 60&10 %
Barb Wire Safety Guards.....₱ 1000 $9.00, dis 25 %
Wire Clothes Lines. See Lines.

Wire Cloth, green, drab and black, ₱ 100 sq.
No. 34 Wire, $1.90; No. 33 Wire, $2.00

Wire Goods.—See Bright Wire Goods.

Wire Rope.—List May 1, 1886.....dis 33⅓

Wrenches.—American Adjustable.....dis 45 %
Baxter's Adjustable "S".....dis 35&10 %
Baxter's Diagonal.....dis 40 @ 40&10
Coes' Genuine.....dis 55&3 %
Coes' "Mechanics'".....dis 55&10&3 %
Girard Standard.....dis 70&10 %
Lamson & Sessions' Engineers'.....dis 60&10 %
Lamson & Sessions' Standard.....dis 70&10 %
Coes' Pattern, Wrought.....
Girard Agricultural.....
Lamson & Sessions' Agricultural.....dis 80 @ 80&5 %
Sterling Wrought.....
Bemis & Call's Patent Combination.....dis 35 %
Bemis & Call's Merrick's Pattern.....dis 35 %
Bemis & Call's Brigg's Pattern.....dis 25 %
Bemis & Call's Cylinder or Gas Pipe.....dis 40&5 %
Remis & Call's No. 3 Pipe.....dis 35&5 %
Aiken's Pocket (Bright).....$6.00, dis 50&10 %
The Favorite Pocket (Bright).....₱ dos $4.00, dis 40 %
Webster's Patent Combination.....dis 25 %
Boardman's.....dis 25@25&10 %
Always Ready.....dis 25&5 %
Alligator.....dis 50 %
Donohue's Engineer.....dis 25 %
Acme, Bright.....dis 60&3 %
Acme, Nickeled.....dis 50&3 %
Walker's.....dis 55&3 %
Diamond.....dis 40 %
Diamond Patent Steel.....dis 40 %

Wrought Goods.
Staples Hooks, &c., list Jan. 12, '87..dis 80&20@85&10 %

CURRENT METAL PRICES.

FEBRUARY 22, 1888.

IRON AND STEEL.

Bar Iron from Store.

Common Iron :
¾ to 2 in. round and square.. } ₩ lb 2.10 @ 2.20¢
1 to 6 in. x ⅝ to 1 in..... }
Refined Iron :
¾ to 2 in. round and square.. }
1 to 4 in. x ⅝ to 1½ in..... } ₩ lb 2.25 @ 2.40¢
4½ to 6 in. x ⅜ to 1 in..... }
1 to 6 in. x ¼ and 5-16 ..... ₩ lb 2.45 @ 2 60¢
Rods—⅝ and 11-16 round and sq.. ₩ lb 2.35 @ 2.50¢
Bands—1 to 6 x 3-16 to No. 12..... ₩ lb 2 50 @ 2.60¢
" Burden's Best " Iron, base price ₩ lb 3.00 @ .... ¢
Burden's " H. B. & S." Iron, base price..... ₩ lb 2 80 @ ....¢
" Ulster "..... lb lb 3.10 @ ....¢
Norway Rods ..... 4.00 @ 5.00¢

Merchant Steel from Store.

Per pound.
Open-Hearth and Bessemer Machinery, Toe Calk, Tire and Sleigh Shoe, base price in small lots..... 3¢ @ 3½¢
Best Cast Steel, base price in small lots. 9¢ @ 10¢
Best Cast Steel Machinery, base price in small lots..... 5½¢ @ 6¢

Extras on Merchant Steel.

Classification and extras adopted by the Merchant Steel Association of the United States January 11, 1888:

Tool Steel.

Round, Square and Octagon.

	Extra per lb.		Extra per lb.
⅝ to 2 in.	Base.	9-16 to ½ in.	0.5¢
2⅛ to 3 in.	1.0¢	7-16 to ⅜ in	1.0¢
3⅛ to 4 in.	1 5¢	5-16 and 11-32 in.	2.0¢
4⅛ to 5 in.	2.0¢	¼ and 9-32 in.	3 0¢
5⅛ to 6 in.	2.5¢	3-16 in.	5.0¢
6⅛ to 7 in.	3.0¢	5-32 in.	10.0¢
7⅛ to 8 in.	3.5¢	⅛ in.	18.0¢

Flat.

⅝ to 2 in. thick x 9-16 to 2 in. wide..... Base

Flat.

	Extra per pound.		Extra per pound.
½ x 3-6	20.0¢	5-16 x ⅜ to ⅝	1.5¢
½ x ¼	15.0¢	5-16 x 11-16 to 8	1.0¢
½ x 5-16	8 0¢	⅜ x 7-16 to 8	1.0¢
⅝ x ⅜	4.0¢	7-16 x ½ to 8	1.0¢
½ x 7-16 to ½	3.0¢	½ x 9-16 to 8	1.0¢
½ x 9-16 to 7	2.0¢	9-16 x 2¼ to 8	1.0¢
½ x 7⅛ to 8	3.0¢	9-16 to 2 x ⅝ to 2 in.	0.0¢
3-16 x ¼	5.0¢	⅝ to 2 in. x 2⅛ to 7 in.	1.0¢
3-16 x 5-16	4.0¢	⅝ to 1¾ x 7⅛ to 8	1.0¢
3-16 x ⅜	3.0¢	1⅞ to 2 x 7⅛ to 8	1.5¢
3-16 x 7-16 to ⅝	2.0¢	2⅛ to 3 x 2½ to 5	1.0¢
3-16 x 11-16 to 2	1.5¢	2⅛ to 3 x 5½ to 8	1.5¢
3-16 x 2⅛ to 7	1.0¢	3⅛ to 4 x 3½ to 6	1.5¢
3-16 x 7⅛ to 8	2.0¢	3⅛ to 4 x 6½ to 8	2.0¢
¼ x 5-16 to ⅝	2.0¢	4⅛ to 5 x 4½ to 7	2.0¢
¼ x 7-16 to ⅝	1.5¢	4⅛ to 5 x 7½ to 8	2.5¢
¼ x 11-16 to 2	1.5¢	5⅛ to 6 x 5½ to 8	2.5¢
¼ x 2⅛ to 7	1.0¢	6⅛ to 7 x 6½ to 7	3.0¢
¼ x 7⅛ to 8	2.0¢	6⅛ to 8 x 7½ to 8	3.5¢

Cutting to multiples or specified lengths, ½¢ per pound for over 24 inches; under, according to contract.

Crucible Spring Steel.

Extra per lb
1¼ to 4 in. x No. 4 gauge to ⅛ in. inclusive. Base
1 and 1⅛ in. x No. 1 gauge to 4 gauge inclusive..... 0.2¢
1 to 3 in. x No. 5 gauge to 7 gauge inclusive..... 0.5¢
¾ to 15-16 in. x No. 1 gauge to 7 gauge inclusive..... 0.5¢
⅞ to 3 in. x No. 8 gauge to 10 gauge inclusive..... 1.0¢
¾ to 3 in. x No. 11 gauge to 16 gauge inclusive..... 2.0¢
¾ to 3 in. x No. 17 gauge to 20 gauge inclusive..... 3.5¢
⅜ to ⅝ in. x No. 10 gauge to 16 gauge inclusive..... 4.0¢
⅜ to ⅝ in. x No. 17 gauge to 20 gauge inclusive..... 5.0¢
⅜ to ⅝ in. x No. 21 gauge to 24 gauge inclusive..... 6.0¢

Cutting to lengths, 24 in and over, ½¢ ₩ lb extra, and under, according to special contract.

Round and Square.

Extra per lb.
⅝ to 1½ in..... Base
1/16 to 9-16 in..... 0.2¢
⅝ to 7-16 in..... 0.5¢
5-16..... 1.0¢
¼..... 1.5¢

Crucible Machinery.

Round and Square.

Extra per lb.
¾ to 3 in..... Base
3⅛ to 4 in..... 0.5¢
4⅛ to 5 in..... 1.0¢
5⅛ to 6 in..... 1.5¢
½ to 11-16 in..... 0.2¢
⅝ to 7 16 in..... 0.5¢
5-16 and 11-32 in..... 1.0¢
¼ and 9-32 in..... 1.5¢
3-16 in..... 3.0¢

Octagons, ½¢ extra throughout the list.

Flats, one-half the extras of the flat tool steel classification.

Cutting to multiples or specified lengths, ½¢ per pound for anything over 24 inches long. For lengths 24 inches or less, according to special contract.

Crucible Sheet Steel.

Extra per lb.
To 21 gauge..... Base
22 gauge..... 1.0¢
23 gauge..... 2.0¢
24 gauge..... 3.0¢
25 gauge..... 4.0¢
26 gauge..... 5.0¢

Crucible Circulars.

Extra per lb.
To 46 in. diameter..... Base
48 in. diameter..... 1.0¢
50 in. diameter..... 2.0¢
52 to 54 in. diameter..... 3.0¢
56 to 60 in. diameter..... 5.0¢
62 to 64 in. diameter..... 7.0¢
66 to 70 in. diameter..... 9.0¢
72 in. diameter..... 11.0¢

Crucible and Open-Hearth Cutlery Steel Classification.

Plain, 1¼ in. to 2⅛ in. x 14 ga. and heavier.... Base
Plain, ¾ in. to 1 3-16 in. x 14 ga. and heavier. ½¢ extra
Plain, 1¼ in. to 2⅛ in. x 14 ga. to 16 ga... ½¢ extra
Plain, ¾ in. to 1 3-16 in x 14 ga. to 16 ga.. 1¢ extra
Plain, ⅛ in. to ¾ in. incl. x 3-16 in. to ⅝ in. 1¢ extra
Plain, 1 in. to 2¼ in. x 17 ga..... 1½¢ extra
Plain, 1 in. to 2⅛ in. x 18 ga..... 2¢ extra
Plain, wicer than 2⅛ in., ½¢ extra throughout classification
Bevel sizes. ...2¢ extra throughout classsification
Round and square, ⅜ to ⅝..... base
Round and square, 5-16 in..... 1¢ extra
Round and square, ¼ in..... 1½¢ extra

Bessemer and Open-Hearth Steels.—Machinery

Round and Square.

Extra per lb.
1 to 3 in. inclusive..... Base
3⅛ to 4 in. inclusive..... 0.3¢
4⅛ to 6 in. inclusive..... 1.0¢
⅝ to 15-16 in. inclusive..... 0.2¢
½ to 11-16 in. inclusive..... 0.3¢
⅜ to 7-16 in inclusive..... 0.4¢
5-16 to 11-32 in. inclusive..... 0.5¢
¼ and 9-32 inch..... 0.7¢

Machine Cutting, specified lengths above 24 inches..... 0 2¢
Machine Cutting, specified lengths, 12 to 24 inches..... 0.4¢

Machine Cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6¢ on each size extra. Sawing, one-half of the above extra for cutting.

Flat.

Extra per lb.
1½ to 6 in. x 5-16 to 1 in. thick.. ..... Base
1½ to 6 in. x ¼ and 9-32 in thick..... 0.2¢
1½ to 6 in. x 3-16 and 7-32 in. thick..... 0.3¢
1½ to 6 in. x ⅛ and 5-32 in. thick..... 0.4¢
¾ to 1 7-16 in x ¼ to 1 in. thick..... 0.3¢
¾ to 1 7-16 in x 3-16 and 7-32 in. thick..... 0.4¢
¾ to 1 7-16 in. x ⅛ and 5-32 in. thick..... 0 5¢
⅝ to 11-16 in. x ¼ to ½ in. thick ..... 0.4¢
⅝ to 11-16 in. x 3-16 and 7-32 in. thick.. .... 0.6¢
⅝ to 11-16 in. x ⅛ and 5-32 in. thick..... 0.8¢
⅝ to ¾ in. x 1-16 and 3 32 in. thick..... 0.2¢
13-16 to 1½ in. x 1-16 and 3-32 in. thick..... 1.5¢
1¼ to 3 in. x 1-16 and 3-32 in. thick..... 1.0¢

Tire, toe-calk and sleigh-shoe steels follow above classification.

Bessemer and open-hearth spring steels are subject to crucible spring classification, except that cutting to lengths, 24 inches and over, is 1-10¢ extra per pound; under 24 inches, by special contract, but no cutting shall be done for less than 1-10¢ extra per pound.

Sheet Iron from Store.

	Common American.		R. G.	Cleaned.
10 to 16	₩ lb 2.75	@ 2.80¢	3.25 @	....¢
17 to 20	₩ lb 2.85	@ 3 00¢	3 25 @	3.50 ¢
21 to 24	₩ lb 3.00	@ 3.10¢	3.50 @	....¢
25 and 26	₩ lb 3 20	@ ....¢	3.75 @	....¢
27	₩ lb 3.75	@ 3.37½¢	4.00 @	....¢
28	₩ lb 3.50	@ ....¢	4.00 @	....¢

	B. B.	3d qual.
Galvanized, 14 to 20	₩ lb 4.80¢	4.70 ¢
Galvanized, 21 to 24	₩ lb 5.20¢	4.87½¢
Galvanized, 25 to 26	₩ lb 5.60¢	5.25 ¢
Galvanized, 27	₩ lb 6.0 ¢	5.62½¢
Galvanized, 28	₩ lb 6.40¢	6.00 ¢
Patent Planished	₩ lb A 10¢	B, 9¢
Russia	₩ lb 9½¢ @ 10¢	
American Cold Rolled B. B.	₩ lb 5¢ @ 7¢	

Chrome Steel.

Tool Steel, ordinary sizes ⅝ to 3 inches. net.....
Adamantine Shoes and Dies.....
Magnet Steel.....

English Steel from Store.

Best Cast ..... ₩ lb 14½ @ 15 ¢
Extra Cast ..... ₩ lb 16½ @ 17 ¢
Swaged, Cast..... ₩ lb 16 ¢
Best Double Shear..... ₩ lb 15 ¢
Blister, 1st quality..... ₩ lb 12½¢
German Steel, Best..... ₩ lb 10 ¢
2d quality..... ₩ lb 9 ¢
3d quality..... ₩ lb 8 ¢
Sheet Cast Steel, 1st quality..... ₩ lb 15 ¢
2d quality..... ₩ lb 14 ¢
3d quality..... ₩ lb 12½¢

METALS.

Tin.

Per lb
Banca, Pigs..... 38 @ 38½¢
Straits, Pigs..... 38 @ 38½¢
English, Pigs..... 37½¢
Straits in Bars..... 39 @ 40 ¢

Tin Plates.

Charcoal Plates.—Bright. Per box.

Melyn Grade	IC, 10 x 14	$6.50
" "	IC, 12 x 12	6.75
" "	IC, 14 x 20	6.50
" "	IC, 20 x 28	13 00
" "	IX, 10 x 14	8.00
" "	IX, 12 x 12	8.25
" "	IX, 14 x 20	8.00
" "	IX, 20 x 28	16.00
" "	DC, 12½ x 17	6.00
" "	DX, 12½ x 17	7.50
Calland Grade	IC, 10 x 14	6.00
" "	IC, 12 x 12	6.25
" "	IC, 14 x 20	6 00
" "	IX, 10 x 14	7.50
" "	IX, 12 x 12	7.75
" "	IX, 14 x 20	7.50
Allaway Grade	IC, 10 x 14	$5.25 @ 5.50
" "	IC, 12 x 12	5.50 @ 5.75
" "	IC, 14 x 20	5.25 @ 5.50
" "	IC, 20 x 28	10.75 @ 11.00
" "	IX, 10 x 14	6.50 @ 6.75
" "	IX, 12 x 12	6 75 @ 7.00
" "	IX, 14 x 20	6.50 @ 6.75
" "	IX, 20 x 28	12.75 @ 13.00
" "	DC, 12½ x 17	5.00 @ 5.25
" "	DX, 12½ x 17	6.00 @ 6.25

Coke Plates—Bright.

Steel Coke.—IC, 10 x 14, 14 x 20		$4.90 @ $5.10
	10 x 20	7.50 @ 8.00
	20 x 28	10.00 @ 10.25
	IX, 10 x 14, 14 x 20	6.00
BV Grade.—IC, 10 x 14, 14 x 20.		4.90 @ 5.00

Charcoal Plates.—Terne.

Dean Grade.—IC, 14 x 20		$4 75
	20 x 28	$9.25 @ 9.50
	IX, 14 x 20	5.75
	20 x 28	11.50
Abecarne Grade.—IC, 14 x 20		$4.50 @ 4.65
	20 x 28	9.00 @ 9 25
	IX, 14 x 20	5.50 @ 5.75
	20 x 28	11.00

Tin Boiler Plates.

IXX, 14 x 20	112 sheets	$12 50 @ $12 75
IXX, 14 x 28	112 sheets	12 75 @ 13 00
IXX, 14 x 31	112 sheets	14,25 @ 14,50

Copper.

Duty: Pig, Bar and Ingot, 4¢; Old Copper, 3¢ ₩ lb. Manufactured (including all articles of which Copper is a component of chief value), 45 % ad valorem.

Ingot.

Lake..... 17.50¢ @ 18¢
" Anchor " Brand..... 16.50¢ @ 17¢

Sheet and Bolt.

Prices adopted by the Association of Copper Manufacturers of the United States, December 10, 1887.

Not wider than	Not longer than	And longer than	Weights per square foot and prices per pound. Over 64 oz.	32 to 64 oz.	16 to 32 oz.	14 to 16 oz.	12 to 14 oz.	10 to 12 oz.	8 to 10 oz.	Less than 8 oz.
30	72		25	25	25	26	27	28	31	33
30		72	25	25	25	26	28	30	34	....
36	96		25	25	25	27	29	33	36	....
36		96	25	25	26	28	30	34	38	....
48	96		25	25	27	29	31	35	....	....
48		96	25	25	28	30	32	36	....	....
60	96		25	25	30	32	37	....	....	....
60		96	25	25	31	....	....	....	....	....
84	96		26	27	....	....	....	....	....	....
84		96	27	28	....	....	....	....	....	....
Over 84 in. wide			28	30	....	....	....	....	....	....

	16 oz.	14 oz.	12 oz.	10 oz.
All Bath Tub Sheets.				
Per pound	$0.28	0 3.)	0.32	0 35

Bolt Copper, ⅝ inch diameter and over, per pound..... 25¢
Circles, 60 inches in diameter and less, 3 cents per pound advance over lowest prices of Sheet Copper of the same thickness.
Circles, over 60 inches diameter, up to 96 inches diameter, inclusive, 5 cents per pound advance over lowest prices of Sheet Copper of the same thickness.
Circles, over 96 inches diameter, 6 cents per pound advance over lowest prices of Sheet Copper of the same thickness.
Segment and Pattern Sheets, 3 cents per pound advance over price of sheets required to cut them from.
Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, 1 cent per pound over the foregoing prices.
Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, 2 cents per pound over the foregoing prices.

Copper Bottoms, Pits and Flats.

Per pound.
14 ounce to square foot and heavier..... 28¢
12 ounce and up to 14 ounce to square foot..... 29¢
10 ounce and up to 12 ounce..... 31¢

Circles less than 8 inches diameter 2 cents per pound additional.

Circles over 18 inches diameter are not classed as Copper Bottoms.